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PAPERS & PROCEEDINGS

OF THE

ROYAL SOCIETY

OF

TASMANIA,

FOR

1894-95.

(ISSUED AUGUST, 1896.)

Tasmania:

PRINTED BY DAVIES BROTHERS LIMITED, MACQUARIE STREET, HOBART.

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CONTENTS.

A

	Page
April Meeting	I
Adye Douglas, Hon.	II
Antarctic Exploration	III
Arctic Research	III
Antarctic World	III
Antarctic Regions	IV
Arctic Seas	IV
Antarctic Expedition	V
American Astronomers	VI
Admiral Bowden-Smith	VII
Ancient Wrecks and Relics of European Vessels on Australian Coasts	XII
August Meeting	XIII
Agnew, Hon. Sir J. W.	XIII
Australasian Association for the Advancement of Science, Brisbane Meeting	XIII
Australasian Association for the Advancement of Science, Adelaide Meeting	XVI
Aryan Races	XVIII
Agnew, Sir James Wilson, May Meeting, 1895	XX
Adamson's Range	XXI
August Meeting, 1895	XXII
Alluvial Drift at Swansea	XXII
Adzes, New Guinea	XXIII
Adams, Mr. O.	XXIII
Agnew, Sir James Wilson, October Meeting, 1895	XXVII
Apologies, October Meeting, 1895	XXVII
Adjourned Meeting, 1895	XXIX
Abel Jansen Tasman	XXXII
Anthony Van Diemen	XXXII
Amsterdam	XXXII
Attorney-General (Hon. A. I. Clark)	XXXIV

B

Barnard, James, Mr.	I
Bednall, Mr. W. F.	II
Bowden-Smith, Admiral	VII
Baron Von Müeller	IX
Bernard Shaw, Mr.	XV
Braddon, Sir Ed. N. C.	XVI
Brown, Prof. W. Jethro	XVIII
Beattie, Mr. J. W.	XIX
Bohemia	XX
Botany of the Hartz and Adamson Ranges	XXI
Bicheno	XXII
Bog Oak	XXII
Bimetalism	XXVII
Benjafield, Dr.	XXIX
Brisbane Weather Bureau	XXX
Brown, Hon. N. J.	XXXI

CONTENTS.

B

	Page
Beattie, Mr. J. W., Lantern Slides	XXXIII
Ben Nevis Observatory	XXXIV
Balfour, Capt., R.N.	XXXIV
Black Swans	XXXV
Bass Straits	XXXVI

C

Chitons, Tasmanian, (a Paper)	II
Crawford, Capt. Pascoe, R.N.	III
Challenger Expedition	IV
Cook, Capt.	V
Cust, Capt., R.N., H.M.S. "Dart"	VI
Correct Time	VII
Connaissance des Temps	VIII
Counsel, Mr. E. A.	IX
City of Hobart...	IX
Centrolepis, a New (a Paper)...	XII
Commissioniers of Fisheries	XV
Chalmers, Rev. Jas.	XV
Col. Cox	XV
Czernowitz University	XXI
Cambria Estate	XXII
Cuculus flabelliformis	XXIII
Continent, Australian...	XXIII
Chalmers, Rev. Jas.	XXIII
Cape York Peninsula	XXX
Cooktown	XXX
Chief Weather Bureau, Queensland...	XXX
Cape of Good Hope	XXXII
Ceylon and Japan	XXXII
Campbell Island	XXXVII

D

Dicker, Rev. C. W. H.	II
December, 1893	VI
Douglas, Hon. Adye	VI
"Dart," H.M.S.	VI
Deputation Appointed (Fur Seals)	XVII
Dobson, Sir Lambert	XVIII
Dobson, Hon. Henry	XIX
Dunedin University	XX
Drift, Alluvial, at Swansea	XXII
Death of Mrs. Charles Meredith	XXIX
Douglas, Hon. Adye	XXXIII
Deputation (Fur Sealing)	XXXVI

E

Excellency Lord Gormanston	I
Erebus and Terror	IV
Ellery, Mr. R. J., Govt. Astronomer, Victoria	VIII
Eucalyptus, a New	IX
Eucalyptus, Described in 1886	IX
Eucalyptus, *mullerii*	IX
European Exporter (Tasmanian Timber)	XI
Economic Price	XXV
Economic Changes, Recent	XXVI
East Indies	XXXII

CONTENTS.

F

	Page
Franklin, Sir John	III
Franklin, Lady	IV
Fincham, Mr. Jas.	XIII
Further Discoveries of Glaciation	XIII
Fauna, Native	XVI
Fur Seal, Protection of the	XVI
Fur Seal in Bass Straits	XVII
Fur Seal on Macquarie Island	XVII
Fur Seal Deputation to the Government	XVII
Fitzgerald, Mr.	XX
Further Proofs of Glaciation	XXI
Foxwell, Prof., of Cambridge	XXIX
Frieslander	XXXII
Fauna, Native, Preservation of	XXXV
Fur Seals, Preservation of	XXXVI
Fisheries Board	XXXVI

G

Gormanston, His Excellency Lord	I
Gothenburg System	I
Government, British	I
Geographical Societies, Royal	III
Geographical Society of England	IV
Greene, Mr. A. Osborn, on Tasmanian Timber	X
Goose Island	XIII
Glaciation on the West Coast	XIII
Government, New Zealand	XV
Guinea, New	XV
Grant, Hon. C. H., September Meeting	XVI
Game Acts	XVI
Geographical Names, Orthography of	XVII
Geeveston	XIX
Guinea, New, Stone Adzes	XXIII
Giffen, Sir Robert	XXIX
Game Act	XXXVII

H

Hogben, Mr. Geo.	V
Henry, Mr. Robert	XIII
Hemisphere, Southern	XVIII
Hartz Mountains	XIX
Hartz and Adamson's Range	XXI
Harvey's Creek	XXI
Henry, Hon. John	XXVII
Hawson, E., Mr.	XXVII
Hewitt, Mr. T. E.	XXVII
Hollanders	XXXII

I

Important Geographical Discovery in the Antarctic Regions	IV
Italy, Timber from	XI
India	XV
Israel, Mr. J. W.	XXXI

CONTENTS.

J

	Page
Jason, Norwegian Schooner	IV
Johnston's, Mr. R. M., Remarks	V
June Meeting, 1894	VI
July Meeting, 1894	X
January (Sealing)	XV
Jethro-Brown, Prof. W., M.A., LL.D.	XVIII
Johnston, Mr. R. M., Vote of Thanks to	XVIII
Johnston, Mr. R. M., Primary Law of Value, &c....	XXV
Johnston, Mr. R. M., Vote of Thanks to	XXVI
Johnston, Mr. R. M., Paper Discussion	XXVII
Japan and China	XXXII

L

Larsen, Capt., of the schooner Jason	IV
Louis Phillipe	IV
Lady Franklin	IV
Larsen, Capt.	V
London Builder	XI
Lands Department	XVII
Lendenfeld, Prof., R.N.	XXI
Lyne Sugar Loaf Range	XXII
Law of Value or Price	XXV
Life and Times of Tasman	XXXII
Lantern Illustrations	XXXIII

M

Mobeek, Dr. E. E.	I
Macnaughten, Mr. R....	I
Minister, Report of British	I
Moebeek, Dr., Remarks	I
Mault, Mr. A. (Paper)	II
Mault, Mr. A. (Paper, Antarctic)	III
Murray, Dr., Challenger Expedition	III
Morton, Mr. A., Challenger Expedition	III
Murray, Dr. (Paper)	IV
Meridian Mark on Mt. Nelson	VII
Mault, Mr., Local Triangulation	VII
Müeller, Baron Ferd	IX
Mt. Wellington	IX
McClymont, Mr. J. R. (Paper)	XII
McAulay, Prof. A.	XIII
Moore, Mr. T. B. (Paper)	XIII
Montgomery, Bishop (Paper)	XIII
Maclaine, Mr., of Clarke Island	XIV
Macquarie Island	XV
Madras Presidency	XV
Main Schouten	XVI
McClymont, Mr. J. R. (Paper)	XVII
Method of Dropping Time Ball	XVIII
Mountains, Hartz	XIX
May Meeting, 1895	XX
Mineral Substance New to Tasmania	XX
Moore, Mr. T. B. (Paper)	XXI

CONTENTS.

M

Page

Meredith River XXII
Meredith, Mr. XXII
Murray XXIII
McCluskey, Mr., Spring Bay XXIII
Morris, Mr. F. XXIII
Moore, Mr. T. B. (Paper) XXIII
Meredith, Mrs. Chas., Water Colours XXVII
Meredith, Mrs. Chas., Death of XXIX
Mount Wellington XXX
Mosses, New (Paper) XXXII
Macquarie Harbour XXXIII
Mt. Wellington as a Meteorological Station XXXIV
Meteorological Observer XXXIV
Moulting Lagoon XXXV
Moore, Hon. W. XXXV
Montgomery, Bishop XXXV
Morton, Mr. A. XXXVI

N

New Species of Pedalion II
Norwegian Schooner Jason IV
Natica mollusca IV
Navy Royal V
North Pole Star VI
New *Eucalyptus* IX
Norway and Sweden XI
New Method of Dropping Time Ball XIII
New Zealand Government XV
New Guinea Ethnological Specimens XV
Native Fauna, Protection of XVI
Notes on a Recent Trip to the Hartz Mountains XIX
Notes on a Mineral Substance New to Tasmania XX
New Fossil Plants to Tasmania XXI
New Guinea Stone Adzes XXIII
Nicholson, Professor, of Edinburgh XXVIII
Northern Queensland XXX
New Botanical Specimens XXXII
New Mosses XXXII
New Zealand, Tasman... XXXIII
Nevis, Ben XXXIII
Native Fauna, Protection XXXVI
North East Coast XXXVI
New South Wales XXXVII

O

Osborne, Capt. Sherard, R.N. IV
Observatory, Hobart VI
Octantes, 1893 VI
Observatory, Melbourne VIII
Observatory, Royal, Greenwich VIII
Osborn Greene, Mr. A. X
Orthography of Geographical Names XVII
Œdicnemus grallarius XXIII
Oyster Bay Pine XXIII
Ogilvy, Mr. A. J. XXVII
Observer, Meteorological XXXIV

CONTENTS.

P

	Page
Penguin, H.M.S.	I
Pedalion, on a New Species of	II
Pascoe, Crawford, Capt.	III
Polar Regions	IV
Polar Area	IV
Pole, North	IV
Phœnicis	VI
Pury Cust, Capt., R.N.	VII
Portugal	XI
Protection of Mutton Birds and Seals	XIII
Protection of Native Fauna	XVI
Protection of Cape Barren Goose	XVI
Protection of Fur Seal	XVI
Protection of Bass Straits and Macquarie Island	XVII
Papua, Voyages to	XVII
Primitive Theories of Political Teaching, Prof. Brown	XVIII
Petterd, Mr. W. F., New Mineral	XX
Plover, Southern Stone	XXIII
Proofs of Glaciation at Low Levels	XXIII
Primary Law of Value or Price	XXV
Peninsula, Cape York	XXX
Primary Law of Value or Price	XXX
Penguin, H.M.S.	XXXIV
Preservation of Fur Seals	XXXVII

R

Robjohns, Rev. T.	I
Rule, Mr. Jas.	II
Ross, Sir James	III
Ross and Weddell	III
Royal Navy	III
Royal Geographical Society of England	IV
Royal Society of New South Wales	XXII
Ricardo	XXIX
Reibey, Hon. Thos., M.E.C., Election	XXX
Rodway, Mr. Leonard	XXXII
Raleigh, Sir Walter	XXXII
Russell, Mr., Observatory, Sydney	XXXIV
Royal Society and the Fisheries Board	XXXVII

S

Sweden, (Dr. E. E. Mobeek)	I
Surgeon, V. G. Thorpe, R.N., F.R.M.S.	I
Surgeon, V. G. Thorpe, R.N., F.R.M.S. (Paper)	II
Solomon Islands	II
South Atlantic	III
Scottish Geographical Society	IV
Scotch and Norwegian Whalers	IV
Sherard, Osborne, Capt., R.N.	IV
Stars, List of	VIII
South Polar Stars	VIII
Shirley, Mr. J., Brisbane	XIII
Straits Islands	XIII
Sheveroy Hills, Madras Presidency	XV

S

	Page
September Meeting	XVI
Schouten Main	XVI
Southern Hemisphere	XVIII
Silver Queen Prospecting Association	XX
Stitt, Mr. J. G. S., of Zeehan	XX
System of Mineralogy (Dana's)	XX
Stitt, Mr. J. G. S.	XXI
Strahan-Lyell Road	XXI
Swansea, Alluvial Drift at	XXII
St. Paul	XXII
Swan River	XXII
Southern Stone Plover	XXIII
Swanssea (Mr. F. Morris)	XXIII
Strahan and Pine Cove	XXIII
Stone Adzes, New Guinea	XXIII
September Meeting, 1895	XXV
Sir Walter Raleigh	XXXII
Spice Islands	XXXII
Spain and the Spaniards	XXXII
South Land Gnat	XXXIII
South Australia	XXXIV
Sydney Observatory	XXXIV
Swans, Black	XXXV
Sealing in Bass Straits	XXXVI

T

Thorpe, Surgeon V. G., R.N.	I
Tasmania, Bishop of	I
Tasman's Tracks	II
Tasmanian Chitons (a Paper)	II
Thorpe, Surgeon (a Paper)	II
Tasmanian Earthquakes (a Paper)	V
Transit Instruments	VI
Transit at the Hobart Observatory	VII
Transit of Venus Expedition	VIII
Tramway Company	IX
Tasmanian Timbers (their uses, etc.)	X
Tasmanian Trees	X
Tasmanian Woods	XI
Tasmanian Sealers	XV
Tasmanian Fur Seals	XV
Time Ball, Dropping the	XVIII
Theories of Political Teaching (a paper)	XVIII
Tasmanian Scenery	XIX
Tasmania, New Fossil Plants to	XXI
Tasman, Abel Jansen	XXII
Tasman, Birth of	XXII
Tasman's Family	XXII
Tasman's Marriage	XXII
Tasman on Service	XXII
Tasman's Command of Ships	XXII
Tasman's Punishment	XXIII

U

Ulrich, Prof. G. H. F.	XX
University, Czernowitz	XXI

CONTENTS.

W

	Page
Weddell	III
Weddell, Mr. Jas.	VI
West Coast	XXII
Wealth, Cosmopolitan	XXV
Watercolour Drawings, Mrs. C. Meredith	XXVII
Wragge, Mr. Clement	XXX
Weymouth, Mr. W. A.	XXXII
Western Australia	XXXIII
Wellington, Mount	XXXIV
Wragge's, Mr., Recommendations	XXXIV

CONTENTS.

PAPERS, 1894.

		Page
1.	The Deportation of the Norfolk Islanders to the Derwent in 1808, by James Backhouse Walker	1
2.	The Gothenberg System, by Mr. Russell MacNaughten, Communicated (Abstract)	I
3.	Note on a MS. Chart in the British Museum, showing Tasman's Tracks in the voyage of 1642-4 (Charts), by A. Mault	27
4.	On Some Tasmanian *Chitons*, by W. H. Bednall (Corresponding Member)	34
5.	Notes on Some River Ouse Fossil Impressions, by Rev. C. W. H. Dicker (Abstract)	II
6.	Notes on a New Species of Pedalion from the Solomon Isles, by V. G. Thorpe, M.D., R.N., F.R.M.S.	40
7.	On Antarctic Exploration, by A. Mault	42
8.	Tasmanian Earthquakes of 1892, by Geo. Hogben (Abstract)	V
9.	Meridian Observations with the Hobart Transit Instruments, by H. C. Kingsmill, M.A.	VI
10.	Notes on Some New and Rare Tasmanian Plants, by Leonard Rodway	51
11.	Tasmanian Timbers, their Commercial Worth and Preparation for Market, by A. Osborn Greene (Abstract)	X
12.	Ancient Wrecks and Relics of European Vessels on Australian Coasts, by J. R. McClymont, M.A. (Title), ...	XII
13.	A New Centrolepis, by Leonard Rodway (Plate)	55
14.	Further Discoveries of Glaciation in Tasmania, by T. B. Moore, F.R.G.S.	56
15.	The Protection of Mutton Birds and Seals, by the Bishop of Tasmania (Abstract)	XIII
16.	Early Voyages to Papua, 1511 to 1545, by J. R. McClymont, M.A. (Title)	XVII
17.	A New Method of Dropping the Time Ball, by Robert Henry (Abstract)	XVIII
18.	Primitive Theories of Political Teaching, by Professor W. Jethro-Brown, M.A., LL.D. (Title)	XVIII
19.	Notes on a Recent Trip to the Hartz Mountains, by J. W. Beattie (Title)	XIX

CONTENTS.

PAPERS, 1895.

		Page
20.	Abel Jansoon Tasman: his Life and Voyages (Maps), by J. B. Walker, F.R.G.S.	1
21.	Notes on a Mineral Substance New to Tasmania, by W. F. Petterd	xx
22.	Notes on Further Proofs of Glaciation at Low Levels, by T. B. Moore, F.R.G.S.	xxi
23.	Notes on Some Fossil Plants new to Tasmania, by R. M. Johnston, F.L.S. (Plates)	57
24.	The Botany of the Hartz and Adamson's Ranges, by Leonard Rodway	64
25.	Notes on Timber Found Beneath Alluvial Drift at Swansea, by Col. W. V. Legge, R.A.	68
26.	Notes on the Fan-tailed Cuckoo in Tasmania *(Cuculus flabelliformis)*, by Col. W. V. Legge, R.A.	70
27.	Notes on the Occurrence of the Southern Stone Plover *(Œdicnemus grallarius)* in Tasmania, by Alex. Morton...	71
28.	Proofs of Glaciation at Low Levels in Tasmania, by T. B. Moore, F.R.G.S.	73
29.	The Primary Law of Value or Price (Diagrams), by R. M. Johnston, F.L.S.	74
30.	Discussion on R. M. Johnston's Paper	98
31.	On Some New Botanical Specimens, by Leonard Rodway ...	102
32.	On the New Genus Petterdiana, by John Brazier, F.L.S., C.M.Z. Soc., London, Corr. Mem. Royal Soc. Tasmania	105
33.	Notes on Some New Tasmanian Mosses, by W. A. Weymouth	106

ROYAL SOCIETY, 1894.

APRIL.

The 1894 session of the Royal Society was inaugurated on Monday, April 9. The President, His Excellency Lord Gormanston, presided. His Excellency formally welcomed Dr. E. E. Mobeek (Sweden), Surgeon V. G. Thorpe, F.R.M.S (H.M.S. Penguin), and Rev. T. Robjohns (Sydney), who were introduced by the Secretary (Mr. A. Morton).

THE GOTHENBERG SYSTEM.

The BISHOP OF TASMANIA read a paper on "The Gothenberg System," communicated by Mr. Russell Macnaughten. The writer explained that the Gothenberg system was co-operation applied to licensing. The state or municipality, acting through a company, bound by certain conditions, set in the place of the publican (in licensed houses owned and managed by the company) officials receiving a fixed yearly salary with a bonus derived not from the alcohol, but from the food and non-alcoholic beverages they might be able to sell. This principle was of paramount importance. The inducement to push the sale of alcoholic liquor was stopped, because the publican was no longer anything but a salaried servant, and because the bonus he received was entirely dependent on the food and non-alcoholic beverages sold. In fact it became his interest to push their sale as far as possible to the exclusion of alcohol, the demand for which was no longer stimulated by any artificial pressure on the part of the publican. The movement that resulted in the establishment of the Gothenberg system began in 1862. The Dean of Gothenberg took a prominent part, and, mainly owing to his exertions, a committee was appointed to investigate the reasons of pauperism and misery at that time very prevalent amongst the poorer classes of the town. The committee decided that it was "to brandy, and brandy alone," most of the sufferings of the working classes were due. A company was almost immediately formed to take over the existing licences of the town on the following conditions :—(1) That the amount of profit to be made by the shareholders should be limited to 6 per cent.; (2) the payment of managers by salary and commission on food and non-intoxicants ; (3) satisfactory accommodation for the public as regards the situation, size, space, food, etc., of all the houses belonging to the company ; (4) all the profits above 6 per cent. to be handed over to the municipality. The company reduced the 60 licences in existence to 43, one for every 1,093 inhabitants. The writer gave his experience in Gothenberg in 1888, where, in the week before Christmas, when the peasantry from the surrounding country districts poured into the town, and although it was market day, he did not see a single drunken man. The company's monopoly applied to spirits only, brandy being the favourite intoxicating beverage. The British Minister's report, drawn up specially for the British Government, entered a verdict, after a careful and unprejudiced observation, distinctly favourable to the system as a whole, special attention being called to the fact that both the consumption of spirits and the cases of *delirium tremens* treated in the hospitals showed a marked decrease.

Dr. MOBEEK said he had always heard that Tasmania kept in the front line of civilisation. He could not understand why England had not yet accepted the Gothenberg system, and eulogistically testified to its beneficial operation in the town in Sweden where he had lived for 35 years.

Mr. JAMES BARNARD characterised the paper as very interesting, and said that the Gothenberg system appeared to have solved the problem of the existence of public-houses with the well-being of society.

The CHIEF SECRETARY (Hon. Adye Douglas) did not see where the good of the system came in. We had not in all Tasmania *delirium tremens* to the same extent it seemed to exist in Gothenberg. Day after day they could go round the city of Hobart and not only not expect to meet a lot of drunken people, but intoxicated people were not often met with. The writer appeared to have gone to Gothenberg and expected to meet a lot of drunken people, and did not. A few years ago a few drunken people might have been met with in Tasmania, but now we were a decidedly sober people. Why should not a public-house be the same as any other house, properly decorated and properly adjusted for the reception of people? Although the houses professed to sell bread in Gothenberg, they were really nothing but drinking places. It was the liquor that brought the profit. Increased sobriety was due to the progress of temperance principles throughout the world. So far as the Gothenberg system was described in the paper, he did not see any advantages in it.

Mr. A. J. TAYLOR thought the introduction of the system would confer a lasting benefit on the community.

Hon. C. H. GRANT, M.L.C., said that in Gothenberg it seemed to him the system was applied to a different set of circumstances, climatic and otherwise, than what prevailed in English speaking communities.

The PRESIDENT said he was not prepared to give any opinion on the question, not having studied it. Two points struck him. It would be a very pleasant thing to have the duty on wine in this colony reduced. Something was to be said for the Gothenberg system, which allowed a municipality to make money out of it, for if a little more money were spent on the streets of Hobart—(but more he would not say.

TASMAN'S TRACKS.

Mr. A. MAULT read a lengthy note on a MS. chart in the British Museum, showing Tasman's tracks in the voyage of 1642-4, and presented *fac-simile* copies of the original chart to the Society for reproduction in its "Proceedings."

Mr. J. B. WALKER said that the Society was indebted to Mr. Mault for his paper. After some remarks on the subject, Mr. Walker said he understood that a portrait of Tasman was on the way out to the Exhibition, and that if it were authentic and original it would be a pity to allow it to leave the colony, for if any part of the world ought to revere the name of Tasman surely it was the colony named after him.

TASMANIAN CHITONS.

A paper on "Some Tasmanian Chitons," by Mr. W. F. Bednall, Corresponding Member (Adelaide), was read.

RIVER OUSE FOSSIL IMPRESSIONS.

Rev. C. W. H. DICKER, with a view to drawing attention to what he believed to be some fossil impressions in the bed of the River Ouse, read an interesting paper on the subject.

The SECRETARY thought the specimens exhibited were more likely to be water ripples than fossil impressions.

Mr. JAMES RULE reminded the writer of the presence of she-oak trees in the neighbourhood.

A NEW SPECIES OF PEDALION.

Surgeon THORPE read some notes on a new species of Pedalion found in the Solomon Islands, and exhibited some microscopical specimens.

The PRESIDENT thanked the contributors of papers, and the proceedings terminated.

MAY.

The usual monthly meeting of the members of the Royal Society was held at the Museum on Monday, May 7, when the chair was occupied by the Hon. C. H. Grant, M.L.C.

Apologies were read from His Excellency the Governor and Mr. J. Barnard, vice-president, for non-attendance. The Secretary said it would be interesting to know that it was just 53 years this week since Mr. James Barnard, its senior vice-president, was elected to membership, his nomination being seconded by Sir John Franklin. With the exception of the period when he was visiting England, Mr. Barnard had seldom missed a meeting of the Council or the monthly gatherings during his more than half century of membership.

ANTARCTIC EXPLORATION.

Mr. A. MAULT read a paper on Antarctic Exploration. The subject, he said, was no new one for the Society, as its founder was the hero of Arctic research, and one of its Fellows a distinguished explorer of the Antarctic world. Detailing Sir James Ross' account of a storm he encountered in the ice in 1842, the lecturer urged the great advantage it would be in all future explorations to have steam instead of sailing vessels engaged in the work. The most important work had been done by Weddell in 1823, and Ross in 1841 and 1842. Weddell crossed the deep basin of the South Atlantic, and had fairly open water. Ross' track took him across no such deep basin, but he also found what the former experienced, the warm underlying current of water, which had a temperature of 39deg. at 1,000 fathoms, against 30 for the surface. At his farthest south, Ross found the warm water at the surface with a temperature of 32deg. against an atmospheric temperature of 27deg., and a sea bottom temperature at 250 fathoms of 33deg. The open sea to be met with in the south was held to be largely due to the existence of a line of seismic and volcanic action extending from New Zealand to Mount Erebus. The knowledge of the Arctic region was of little value in predication of the Antarctic conditions, the difference between the two, especially in regard to meteorology, being entirely and unaccountably different. The barometric pressure, for instance, was much less in the south than in the north by about half an inch of mercury. Then the Arctic region had a summer, but there was none in the Antarctic so far as was known. The variations of the thermometer were also very slight in the Southern Polar district. He quoted largely from papers read before the Royal Geographical Societies, and concluded by urging the advisability of prosecuting further researches in the Antarctic regions. Commercially speaking he left to others, although he felt that commerce always followed thorough scientific exploration. But the scientific interests were so important as to fully justify their being regarded as of such national concern as to require a special expedition. Tasmania in particular was interested in the matter of terrestrial magnetism observations, and he hoped that renewed attention would be given to the matter. His own opinion was that the exploration should be carried out by the Royal Navy, and if it were done then one of the vessels of the Australian squadron might very well be allowed to take part in it.

Captain PASCOE CRAWFORD, R.N., said he was very interested in the paper and the subject matter, and quite concurred in the opinion that the work of Antarctic exploration should be carried out by the Royal Navy. There was a great deal to be done in the matter. In previous expeditions the ocean currents had been observed, and the result of the observations was of great value, but there was still a mass of evidence to be collected on the subject. As regards Tasmania and Australia, fresh and more elaborate information on the currents would be of much value meteorologically.

Mr. MORTON said Dr. Murray, one of the members of the scientific staff that was on board the Challenger expedition, had recently read a paper before the Scottish Geographical Society entitled "Notes on an Important Geographical Discovery in the Antarctic regions." Dr. Murray stated that the most interesting discovery made by the whalers who last season visited the Antarctic Seas to the south of Cape Horn was that of the Norwegian schooner Jason, under the command of Captain Larsen. During a short visit to the shores of Seymour Island Captain Larsen picked up a good many fossils, which had fallen from a decomposing cliff. Some of these fossils were procured by Dr. Donald, and on critical examination they turned out to be specimens of *Cucullæa*, *Cytherea*, and *Natica mollusca*, similar to those found at Table Cape of the Tertiary period, together with some pieces of a coniferous tree. These fossils, Dr. Murray writes, are probably of lower Tertiary age, and indicate a warmer climate than now prevails in these high southern latitudes. Captain Larsen, Dr. Murray says, has again made a voyage in the Jason to the same waters as last year, and has made some highly important geographical discoveries—the most important made in the Antarctic regions since the time of Captain Ross in the voyage of the Erebus and Terror. In 1843 Ross spent nearly the whole season in attempts to penetrate the ice to the south and east of Louis Philippe and Joinville Land. Last year the Scotch and Norwegian whalers found the sea blocked in the same position. Captain Larsen this year found a comparatively open sea, and was able to proceed a considerable distance within the Antarctic Circle to the south of Louis Phillipe Island. Dr. Murray, in his able paper, states that statements with reference to currents show that they come from the south. Although the barometer is relatively low, as in the case of all the observations in these latitudes, still there is often bright weather, especially when the wind is from the south. So far as they go, Dr. Murray says these observations of Captain Larsen confirm the view that there is a large anti-cyclonic region overlying the Antarctic Continent. In a paper I read before this Society in 1890, entitled "What Science and Commerce may gain from an Antarctic Expedition," I said that until we know all that can be discovered as to the limit of pack ice, the extent of the Antarctic Continent, the influence of Mount Erebus, the distribution of flora and fauna, and the probabilities of successful whale fishing, there will be enough to gain, either from a commercial or scientific point of view, to make it worth while to send an expedition to the Antarctic regions. Further, I suggested that England and Australasia should unite in sending an expedition so equipped and manned that failure, if not impossible, should at least be unlikely. As far back as 1865, in a paper read before the Royal Geographical Society of England by Captain Sherard Osborne, R.N., C.B., an eminent authority on the Polar regions, said, "an exploration of the Polar area should always be sent under naval auspices and naval discipline. The navy of England cries not for mere war to gratify its desire for honourable employment or fame, there are other achievements it knows well as victorious battle. Upon these points, as well as those of scientific results, it would not be too much to ask for a fraction of the vast sum yearly sunk in naval expenditure for two small screw vessels and 120 officers and men, out of the 50,000 men annually placed at the disposal of the Admiralty." In a letter written by that noble lady, the late Lady Franklin, dated Madrid, April 6, 1865, the following passage occurs:—"For the credit and honour of England, the exploration of the North Pole should not be left to any other country. It is the birthright and just inheritance of those who have gone through 15 years of toil and risk in Arctic seas. The glory that yet remains to be gathered should be theirs." I think we may very safely add the words, Antarctic exploration. Dr. Murray con-

cludes his very interesting paper as follows:—"The excursion of this small sealing schooner shows what large additions might in a short time be made to our geographical knowledge by a properly equipped expedition provided with steam power. If our Government would send for a British expedition, as is now being proposed, almost every branch of natural science would be enriched. Such an expedition must be accompanied by scientific men, and be fitted with all the apparatus of scientific investigations, or otherwise the expenditure and risk would hardly be justified. To determine the extent and nature of the land making up the Antarctic Continent, to penetrate into the interior of this continent, to ascertain the depth and condition of the ice cap, to take magnetic and meteorological observations on sea and land, to sound the ocean, to ascertain the temperature of ocean waters at all depths, to trawl up the animals on the sea floor, and to study the nature of the marine deposits; all this would be the work of a modern British Antarctic expedition. It is earnestly demanded by the science of our day, and should be undertaken by the Royal Navy in the same way as the expeditions of Cook, of Ross, and of the Challenger. It is to be hoped that the scientific societies and the general public will soon urge this matter on the attention of our Government. It is evidently our duty to undertake this kind of work as in the past. If we do not do so, then it is good evidence that the present generation takes little interest in conquests over the powers of nature, and is little concerned in maintaining the maritime position and scientific reputation of this great empire."

With Dr. Murray's paper is an extract from the Jason's Journal, from November 15, 1893, to December 14 of the same year. Captain Larsen gives the weather from calm and sunshine to good strong northerly and westerly winds. They saw and captured several seals, saw what they describe many blue whales and grampuses. On the 6th December he describes the weather as having been nice and warm, also saw many birds and some small fish with large eyes.

Mr. R M. JOHNSTON also concurred in the necessity of the Royal Navy undertaking the work of exploration in the Antarctic Seas There were many problems to solve, especially in regard to the existence of pre-glacial vegetation in the regions as had been found in the Arctic sphere. It would be of very great scientific interest, and although it was to be feared that local governments might not be inclined to undertake the work for a year or so, still he hoped that it would not be long before such an expedition set out either from the shores of Tasmania or Australia.

The SECRETARY (Mr. Morton) submitted a paper prepared by Mr. George Hogben upon "Tasmanian Earthquakes [of 1892," which was read.

JUNE.

The usual monthly meeting of the Royal Society was held on Monday, June 11, under the presidency of the Hon. C. H. Grant, M.L.C.

The SECRETARY (Mr. A. Morton) tabled a work entitled "A voyage towards the South Pole performed in the years 1822-24, containing an examination of the Antarctic Sea to the 74deg. of latitude," by James Weddell, Esq., presented by the Rev. J. B. W. Woollnough, M.A., M.H.A.; also "Papers and Proceedings of the Royal Society of Tasmania for 1893." The Secretary drew attention to an innovation in the latter volume, consisting of the inclusion of a form of bequest on the lines adopted by many leading scientific societies.

MERIDIAN OBSERVATIONS WITH THE HOBART TRANSIT INSTRUMENTS.

Mr. KINGSMILL said: The object of my paper is to bring under your notice a piece of astronomical work done at the Hobart Observatory, in the first instance by myself, and afterwards more completely be Captain Cust, of the Dart. This work was the determination of the meridian of the Hobart transit instrument by means of star observations taken with the instrument itself. The American astronomers determined a meridian with great accuracy when they came here on the transit of Venus expedition, and it would be possible to draw a parallel to it by offsets, as the Hobart Observatory is only 57ft. west of their meridian. But this method would be far less accurate than the determination of a fresh meridian by independent observations. There is a meridian mark for the Hobart transit instrument near Mount Nelson, just above the rifle range, and a little to the east of it. A stone something like a milestone has been erected in brickwork with a crosscut in it to indicate the exact meridian. When I came to the Observatory I was told that the cross was wrong, and that the true meridian was close to the eastern edge of the stone, but there was no record of the exact amount of the error. To obtain the exact local time it is necessary to find out all the errors of the instrument. It is by a number of small corrections that accuracy is obtained. However, this error appeared to require a pretty large correction. In December, 1893, I took some observations of the Southern Pole Star and Octantes which, satisfied me that the true meridian was clear of the stone altogether and to the east of it. It happened that there was an iron-dropper in a wire fence very nearly in the right position, and I used this as a temporary mark. It is perhaps not generally known that the Australasians have a pole star of their own considerably nearer to the Pole than the celebrated North Pole Star. But, unfortunately, we cannot see it with the naked eye. Still it can be seen with a telescope of very small power, and it affords an easy and accurate method of determining the meridian. Several other methods were adopted as a check, as follow:—The instrument was first carefully levelled and collimated, then set in a vertical position to observe a star passing directly overhead. It happens that in the latitude of Hobart several stars pass almost exactly overhead. One of these and Phœnicis are only 6sec. from the vertical. By observing the transit of a vertical star the exact time can be obtained with an instrument not in the true meridian. In that position the azimuth error has no effect. Having determined the true time in this way, Octantes, the pole star, was next observed, and followed with the middle wire of the instrument until the time he was due for his transit. Having by this and other methods made sure of the result I wrote to the late Chief Secretary (Hon. Adye Douglas), pointing out the necessity of having the transit instrument exactly in the line of the true meridian; that I had found by a number of star observations that the meridian mark was considerably out of the line, and that it would be necessary to shift the stone; that in its present

position it was useless for the purpose for which it was intended, and asking that my observations as to the error, and calculations of its amount, might be referred to a practical astronomer for verification. The request was referred to Admiral Bowden-Smith, who replied that directions had been given for the Dart to comply with it. Captain Purey-Cust then came to the Observatory, and I placed everything at his disposal. After making a great number of observations he prepared the following report to the Commander-in-Chief of H.M. ships, Australia :—

Difficulty in Ascertaining Correct Time with Transit Instruments at Observatory, Hobart.—H.M.S. Dart, in Frederick Henry Bay, April 5, 1894. Sir,—In accordance with your memo of February 21 as to the above, I have the honour to report as follows :—1. Transit Instrument—The instrument in use is of 2in. aperture, and 22½in. focal length ; it has none of the usual accessories of modern transit instruments, such as micrometer, tangent screw for sideway motion of the eyepiece, reversing apparatus, etc., which greatly facilitate and add to the excellence and accuracy of the observations obtained ; still, in the hands of a carefnl observer no doubt an accuracy sufficient for the purpose required, viz., the rating of chronometers, is obtained. Mr. Kingsmill has lately caused to be added a Bohenbergen eyepiece and amalgamated mercury trough ; this has greatly facilitated the speedy and correct adjustment for collimation and level. The amalgamated form of mercury trough is especially essential on account of the vibration set up by the trams, which pass on either side of the Observatory at a distance of under quarter mile on an average of four times every quarter of an hour. 2. Clocks.—There are two clocks—one, a sidereal in the transit hut, is exposed to every variation of temperature, and in consequence has an ever-fluctuating rate ; the other, a mean solar clock in the Observatory building, has to be corrected every day at noon to exact mean time for dropping the ball, and can therefore be said to have no known rate. Consequently in the event of cloudy weather no dependence can be placed on either of them, and the time is regulated by a single box chronometer kept in the Observatory building. At present there are no ready means of accurately comparing the clock in the transit hut used for observation with either the chronometer or the mean solar clock. At small expense a clock face might be fitted close to the mean solar clock electrically connected with the sidereal clock, affording a simple and extremely accurate method of comparison between the two. This is the method usually employed in all observatories. A good standard clock is much needed ; this could be placed in the cellar for the sake of uniformity of temperature, and electrically connected as above with the room in which is the mean solar clock. 3. Error in Position of the Meridian Mark on Mount Nelson.—In order to obtain this the distance of the meridian mark from the transit instrument was first ascertained by triangulating between the two, using certain data obtained from a local triangulation by Mr. Mault, for a base line. This distance was found to be 6,479ft. A wooden scale was then erected horizontally across the meridian mark, and graduated in arc so as to form a distant micrometer when viewed through the telescope of the transit instrument ; this enabled the azimuth error, as found by observation, to be actually shown in lineal distance at the meridian mark. Observations were made as opportunities offered on various nights of, pairs of stars differing considerably in declination, of polar stars and pairs of circumpolar stars at opposite culminations, with the resulting mean deviation of 64″ of arc, showing the present position of the meridian mark to be 2ft. to the westward of the true meridian. This corresponds very nearly with the error that Mr. Kingsmill had previously estimated and allowed for. The probable error of the observations by the method of the least squares is + − 2″6 ; this cor-

responds to a lateral distance of + − 1in. at a distance of 6,479ft. The meridian mark in its present position is quite useless for the purpose intended, and I would suggest that it be moved 2ft. eastwards into the true meridian, and also that there be cut in on the face of the stone, in addition to the present × in circle, a few micrometer teeth on either side, exactly similar to the marking of the present temporary wooden scale. This would enable the residual small errors in azimuth of the transit telescope to be at any time during daylight read off in seconds of arc and allowed for in the usual manner, instead of the frequent injurious alterations of the adjusting screws of the instrument. 4. I would further wish to point out that, although when this alteration is effected, the time by the transit instrument will be obtained with all the accuracy necessary for the purpose, yet that the present means of communicating it to the shipping in port by means of the time ball are quite inadequate and liable to error. Signals are sent from the Observatory to the signalman at the flagstaff, Fort Mulgrave, where the time-ball is situated, by electricity during the last minute previous to 1 p.m. The electrical fittings are so inferior that they frequently break down entirely for days together. Mr. Ellery, the Government Astronomer at Melbourne, whilst recently in Hobart gave as his opinion that this might be remedied by a very simple alteration. Again, the ball is hoisted by a rope and winch, and in order for the ball to appear to drop at 1 p.m. it is necessaryfor the signalman to let go the winch handle a certain time beforehand ; this he does when he sees the last time signal at 2sec. to 1 p.m., he actually lets go about 1sec. to 1 p.m., and the ball itself drops about half a second past 1 o'clock ; by dint of long practice and habit this error is fairly constant, and varies from 0·5sec. to 0·8sec. too late, but it is obvious that the error is liable to variation, and that under the circumstances it is absolutely impossible for the man to drop the ball exactly at 1 p.m. This, I think, might be obviated by some simple automatic method of dropping it, to work with the assistance of a relay by the same electric current from the Observatory as works the time signal. It would be a good plan in future when the time-ball fails in accuracy to hoist it again immediately half-mast, close up at 1·55, and drop it in the usual manner at 2 p.m., publishing the error in the next morning's paper. This is the usual method adopted in many ports in similar cases. 5. Lists of Stars —The Nautical Almanac is quite inadequate for transit work, especially in south latitudes, by reason of the small number of stars, and especially South Polar stars, for which the apparent places are given. It is seldom or never used, even at the Royal Observatory, Greenwich, the French "Connaissance des Temps," published annually, price 4f. 75c., being much preferable ; *e.g.*, in the "N.A." the App. places of 224 time stars are given, and one South Polar star ; in the "Connaissance" the App. places of 360 time stars, and 11 South Polar stars. I would suggest that this work be added to the Observatory Library. 6. Geographical Position.—The position of the transit instrument has been calculated from that of the transit pier in the Barrack-reserve, used by the U.S. Transit of Venus Expedition in 1874. As this latter stone is the standard of longitude for Tasmania, I would suggest that a permanent record be cut on it giving the exact latitude and longitude. These are furnished by the Melbourne Observatory, viz., lat. 42·53 deg. 24min. 6sec.; long. 147·19deg. 57min. E. I have the honour to be, sir, your obedient servant, Herbert E. Pury-Cust, Lieutenant and Commander."

That is the report, and the colony owes a debt of gratitude to Captain Cust in providing us with it, and for which the colony did not spend one penny.

Mr. Mault urged that the great utility of the work done at the Observatory would be enhanced if the Government would add to the establishment some magnetic instruments.

Mr. E. A. COUNSEL interestingly reviewed the development of time-keeping, and pointed out the great consequence correct time was now in these days of quick communication, and the disastrous results likely to follow to life and commerce in places where railway facilities were numerous if correct time were not maintained.

The CHAIRMAN followed the previous speakers in praise of Commander Cust's work, and hoped that the colony would be long supplied with Mr. Kingsmill's observations. With the assistance of the Leake bequest he hoped that the Observatory would be made one of the permanent attractions of the City of Hobart. Although the present was not a propitious time to approach the Government for assistance, still he thought the Royal Society would help in securing the modest additions necessary to enable the work to be done more accurately.

Mr. KINGSMILL referred to the difficulties experienced with the present arrangements for working the time-ball and gun. The electrical method was the most perfect, and as the use of the current would be but momentary, he suggested that arrangements might be made with the Tramway Company for utilising their powerful current to work the ball and fire the gun simultaneously. (Applause.)

The CHAIRMAN thought that there would be no difficulty in securing such an arrangement

A NEW EUCALYPTUS.

Mr. L. RODWAY read some botanical notes on new and rare plants, the chief interest centering on a further description of a eucalyptus (described in 1886 by Mr. T. B. Moore, and named *Eucalyptus müelleri*, after Baron von Müeller), from specimens found on the southern slope of Mount Wellington, just below the Springs, where the tree attains a height of 200ft. and more. With regard to the timber he said—"The wood is of a pale red colour, and rather heavy; of a close fibrous texture, of great tenacity, and is commonly used for palings and shingles, but it makes excellent axe handles, and would be very useful for all purposes where considerable strength and toughness are required.

A CORRESPONDENT LOST.

The SECRETARY read a letter from Baron von Müeller, stating that some gentleman in Launceston had asked him for his opinion regarding the reservation of several acres of public land for preservation in its pristine beauty. The answer was delayed, the Baron wishing to send a book with the reply. When the book was obtained, the letter containing the name and address of the correspondent could not be found. The Baron now forwarded the book to the Secretary of the Royal Society to hand to his correspondent if discovered.

JULY.

The monthly evening meeting of the Royal Society of Tasmania was held at the Museum on Tuesday evening. Mr. James Barnard occupied the chair. Apologies for absence were received from the President (Viscount Gormanston) and the Hon. Sir J. W. Agnew.

TASMANIAN TIMBERS — THEIR COMMERCIAL USES AND PREPARATION FOR MARKET.

Mr. A. Osborn Green read a practical paper on this subject. He stated that last year Tasmania's timber exports were valued at £18,000, the imports at £9,000, and the excess of exports over imports for the past five years was £66,000. Norway, a poor and sparsely inhabited country, with no trees that would cut 12in. planks, exported every year timber valued at several millions sterling. Tasmania was covered with trees, some of which would singly furnish sufficient timber to build a ship; trees furnishing timber for every industrial purpose, comparing favourably with any for keeping in truth, durability, hardness or softness, heaviness or lightness, beauty of marking, and fragrance. Notwithstanding this Tasmanian timber exports were nominal, the woods not being merely unknown in the world's markets, but the majority were only known as curiosities in the city of Hobart itself. A buyer would have difficulty in placing an order for them. Out of the 10 eucalypti of the island 6 were not obtainable in plank. But it was gratifying that our timber imports were yearly falling off, and it should be the endeavour of every one with the interests of Tasmania at heart to bring her valuable timbers into more general use locally, and by the diffusion of more exact knowledge to bring about such an export trade as would for ever assure the colony a large and certain revenue. He submitted a complete list of Tasmanian timber trees. These would supply timber for every industrial purpose for which timber was used. It was said that "common hardwood" was not to be depended upon. The faults were not of the timber, but attributable to distinct kinds of trees, cut in and out of season, being promiscuously bundled together under the name of "gum" or "hardwood" timber, to the want of classification, and to the use of unseasoned timber where only seasoned should have been used; or, where unseasoned timber was admissible, using it without proper provision for the shrinkage which must occur. Suppliers and users must recognise the necessity for treating timbers like men—timbers must be classified and put to the work for which they were best suited. It was a hopeful sign that a large cargo of named eucalyptus had been sent to London, profitably sold, and a second cargo was being prepared. Sawmill owners and timber merchants had prayed for an independent inspection before the timber was shipped, and were diligently seeking how to assure a continuation of orders and further expansion of business. The necessity for inspection was shown by the fact that some lots were not allowed to be shipped, and chiefly owing to the appointment of an independent inspector the shipment had been described as undoubtedly the best that had ever been sent from Hobart. This was satisfactory, but it was only once. The inspector was only appointed temporarily, and his duties then only extended to keeping out bad timber. The timber was only to be used for the commonest purpose, for paving roadways, and coming into competition with the cheapest timber placed upon the London market—yellow deal in short lengths. Not that yellow deal was by any means to be despised, for it was of a durable nature, and the people supplying it graded and classified it as a matter of course. Therefore, if our exporters hoped to keep the footing already obtained they must not dream of relaxing a jot of the conditions by means of which that foot-

hold was obtained. One mixed or inferior shipment would have a most damaging effect ; might, indeed, put Tasmania out of the market for a generation, for no man had such a long memory as a deceived business man. The intrinsic merits of Tasmanian timber would shortly win for it a position in the home markets if they were not clouded and hidden by the ignorance and carelessness, or worse, of millers and exporters. Let millers either ring or fell at the right season, classify their logs, honestly grade their planks, and beyond this not only submit to but court and demand the most rigid independent inspection and marking—then not only would the Derwent from New Norfolk to the sea be thickly dotted with vessels bringing timber to regular lines of ships crowding the wharves of Hobart, but the sound of the axe and the hum of the saw would be heard throughout the island. A vast opening existed for our timbers in England, France, Spain, Portugal, Italy, and the Cape. He described in detail the method of preparing for market Baltic deals, the wood at present in competition with Tasmanian hardwood for paving blocks. The trees were felled when the sap was down, and they were sorted for size ; butt lengths of large trees were set apart for first quality, small butts for second, and tops for third and fourth qualities. On being sawn, the planks were again examined and sorted before leaving the mill. At the port of shipment the timber was closely examined for size, cutting, and quality, the deals going forth to the world as first, second, third, or fourth quality, according to the classification adopted at the particular port of shipment. In Norway and Sweden numerous marks were used to denote each quality, so that the London builder finding "Jansen's" cutting suitable, naturally inquired for his trade mark when next in the market. Builders did not use deals promiscuously, but chose one mark for framing doors, another for studding, house and warehouse floors, each having marks considered most suitable. At other Baltic ports, sworn officers marked timber and other produce as first, second, and inferior. Unmerchantable qualities were not allowed to be exported to bring the port into discredit in distant lands. These marks were so well and faithfully applied that merchants would buy on the mark alone, and the value of the marked timber was as well established as the price of gold. By the lettering of the mark the purchaser could pick out stacks coming from particular districts near certain ports of shipment, having found by experience that the timber wanted was there produced. Satisfying himself by inspection that the standard of excellence he had so long known was still maintained, he went with confidence either to make an offer for the shipment or to bid for lots at the next auction. Not a deal, plank, or batten was sent to market without being plainly branded on the end with marks denoting where it came from, and its quality. The European exporter knew that only by the strictest honesty of classification could he gain the confidence of the market and full prices. In these days of keen competition the difference of a small percentage in the selling price meant the difference between an assured competence and ruin. At present England was looking for new sources of timber supply. Australasia was anxiously seeking an outlet for her superabundant resources. To retain her advantage, he suggested that Tasmania should see :—"(1) That all timber be rung or felled when the sap is down. (2) One colour should be chosen for branding Tasmanian timber. (3) That every millowner register a set of marks, a separate mark for each quality of each timber that he saws, and mark each piece that leaves his mill, it being more important to mark bad qualities 'bad' than good ones 'good.' (4) That all registered marks be properly protected. (5) To collect and make public the fullest information concerning the marks and qualities of our timbers generally, giving equal prominence to the merits and defects of both the species of

timber, and of the same timber from different localities, pointing out details by which the quality may be judged, in fact placing the whole of the local knowlodge freely at the service of inquirers. (6) At the outset to allow nothing to be sent to Europe but first quality timber, and to prevent second quality being sent until there was an inquiry for it. (7) That an independent authority shall verify all marks before timber is allowed to be exported, and place an official mark upon each piece- (8) If the timber were picked and marked for certain uses, *e.g.*, paving, framing, floors, implements, tool handles, etc., it would be an advantage." The classification mentioned was necessary for any timber, and for eucalyptus perhaps more than any other in the world. With such a system of classification, with millers ready to supply any quantity at short notice, and exporters able to supply seasoned or fresh timber, a great deal necessary to ensure success would have been achieved. But to complete the scheme it would be necessary to have an energetic, well-educated business man, well up in the qualities and uses of timbers, with samples portable and in bulk, in the rough and in finished articles, whose business it should be to drive home to users the advantages of our timbers. Tasmania must be satisfied with no half measures if she wished to compete with her neighbours, to introduce a new material into the markets of England and to change the trade customs of one of the most conservative of countries.

A number of specimens of timber were shown by Mr. Green to illustrate the superiority of Tasmanian woods, and the reading of his paper evoked loud applause, subsequent speakers, including Hon. C. H. Grant, M.L.C., Messrs. T. Stephens, M.A., F.G.S., A. Montgomery, and Morton, endorsing generally its contents.

OTHER PAPERS.

Mr. James R. McClymont, M.A., contributed an interesting paper on "Ancient wrecks and relics of European vessels on Australian coasts." The writer dealt with wrecks belonging to the seventeenth century, and treated his subject chronologically and topographically.

Mr. L. Rodway described "A New Centrolepis," of the order Centrolepidiæ, seldom honoured with attention by any but the inveterate collector or the botanical student.

The customary votes of thanks were passed, on the motion of the Chairman, who mentioned the probability of the Council considering the timber question one of sufficient importance for a renewal of the discussion at the next meeting.

AUGUST.

The usual monthly meeting was held on Tuesday. There was a fair attendance of Fellows, and a few ladies. The chair was taken by Mr. T. Stephens, M.A., F.G.S. The Hon. Sir Jas. Wilson Agnew, K.C.M.G., M.D., M.E.C., and Mr. Jas. Barnard wrote apologising for their absence.

The Secretary, Mr. A. MORTON, read a circular from Mr. Shirley, secretary to the Australasian Association for the Advancement of Science, which meets at Brisbane on January 11, 189?, and following days, soliciting the assistance of Fellows in making the meeting a success, and promising them a cordial reception. Railway and steamboat fares would be reduced to visitors. Mr. Morton stated that Professor McAulay and Mr. Fincham, Engineer-in-Chief, would read papers at the Brisbane meeting.

Mr. Robert Henry was unfortunately detained by heavy weather in the Straits Islands, consequently the reading of his paper "On a new method of dropping the time ball" was postponed.

GLACIATION ON THE WEST COAST.

Mr. MORTON, on behalf of Mr. T. B. Moore, read a paper on "Further discoveries of glaciation in Tasmania." The paper was lengthy, but most interesting. The writer commented on papers read by himself and other Fellows on the same subject at previous meetings of the Society. A number of specimens of rocks subjected to glacial action accompanied the paper, and were used to illustrate the writer's observations.

The CHAIRMAN briefly reviewed the paper, and explained the difference between conglomerates and morains, and their probable origin.

THE PROTECTION OF MUTTON BIRDS AND SEALS.

Bishop MONTGOMERY read the following paper :—

In the course of my annual trips to the Furneaux Islands I have obtained information from those whose knowledge of the habits of the sooty petrel can be relied upon, and I beg now to lay before the Society some further results based upon personal observation and on inquiries among the half-castes, in order to supplement what I read on a previous occasion on the same subject. The following is an accurate statement of that wonderful rush of these birds to their breeding places every evening till the whole colony takes its departure. On Goose Island, evening after evening, I ensconced myself under a rock for five days, noting every indication of the habits of these birds. The sooty petrel returns to its hole in silence, except in the case of a few belated individuals, who indulge in a hoarse cackle as they fly to and fro, apparently unable to find their holes at once when the night is very dark. On one occasion I took up a position, watch in hand, on a rising ground, from which I could overlook the whole rookery, as well as the sea on both sides of the island. It was in the month of February. At 6.35 p.m. not a petrel was to be seen anywhere, though I could see for miles on all sides. At 6.40 the first bird came into view. At 6.43 the sun disappeared; 6.48, sunset from the top of the lighthouse and the light flashed out; Cape Barren geese heard in the distance settling for the night. 6.53, the first petrel flew rapidly over the island without settling. 6.56, the numbers so great that I stopped counting, unable to do so. 6.58, the birds now so numerous that their flight was bewildering. 7.6, the numbers at their maximum. 7.30, nearly all the birds had arrived,

and now the underground noises were most extraordinary, as oil was being poured down the throats of tens of thousands of young birds, apparently to their intense satisfaction after their 24 hours' fast. I desire also to place on record the following fuller statement of the sooty petrel at an earlier period of its annual sojourn amongst us. I believe the facts can be relied upon as correct. In September mutton birds come back to us to dig their holes. Where they have been since the previous May no one seems to know with certainty. I have interrogated captains of many ships whether they have ever been seen by them in these winter months. In all cases they have replied in the negative. And it seems we are forced to the conclusion that they betake themselves towards the South Pole. After digging their holes they vanish for about a fortnight, after that they reappear to lay their eggs. The female soon loses her condition and betakes herself to the sea for about a week, not returning during the interval. Meanwhile the male bird sits upon the egg, and he in turn is relieved by the female in order to recover his condition. The egg is hatched in about five weeks. When the young bird appears both parents return every evening to feed their offspring. For most of the time the birds desert the vicinity of their breeding places during the day, but in the Furneaux Islands during the prevalence of easterly and south-easterly weather the parent birds keep near home, the reason being, as is supposed, that this wind brings them especially large quantities of their food. It was remarked to me also by some of the most experienced hands that after a continuance of south-easterly weather they always expect to obtain a larger quantity of oil from the birds. When the young bird is taken and killed he is carefully spitted on a stick and kept head upwards till about 50 are obtained, when the worker squeezes the oil from them, and sends them away to be plucked and salted. Every year one or two white specimens of this bird are seen. I am doing my utmost to obtain one for this museum. To turn now to the practical working of the Act passed some two years ago for the protection of the mutton bird industry, there is no doubt at all that the provisions of the Act have been most beneficial, and, practically speaking, if the regulations are fairly carried out, the petrels will never leave these islands, nor will they diminish in numbers. There are a few points, however which deserve the attention of our legislators. At present there is no restriction placed on the number of persons permitted to bird on any island ; some day trouble may arise. It is certain that if the number of workers were doubled the industry would be endangered. Secondly, there is a feeling among some of those engaged in the industry that the old birds should be protected, certainly while they are feeding their young, possibly whilst they are hatching their eggs. At present they may be taken at either period for consumption on the spot. Certainly to leave the young bird to die of starvation is contrary to the dictates of humanity. It might be wise to make a regulation that no old birds were to be taken after a fixed day in January. This would prevent the death by starvation of young petrels.

THE SEALING INDUSTRY.

As the seal rocks are now to be thrown open once more to sealers after a close time of about three years, it may be of interest to the Society if I lay before its members the suggestions made by sealers and others for the protection of the industry. Mr. Maclaine, of Clarke Island, advocates the protection of female seals altogether, following the law that obtains in the Behring Straits. On the other hand, the most thoughtful of the sealers themselves assert that this would virtually stop sealing, inasmuch as the female seal is much more numerous on the rocks than the male; but whether this last

assertion is true I am not in a position to say. But whilst these men do not wish to be altogether debarred from killing female seals, they view with abhorrence the destruction of the females whilst their young are dependent upon them. More than one of them has described how heartrending are the cries of the little seal left to starve on the rocks before it can take to the water. These people advocate a close time for seals every year, namely, the period when the pups are being suckled and before they take to the water. The time they suggest is November, December, and half January. This is the season when the seals are easily killed, since they will not leave their young. Before the young seals are born, apparently, the females can take very good care of themselves. The Tasmanian sealers look with apprehension also upon the advent of vessels from New Zealand. They tell a story (I give it as I heard it) that the crew of one of these foreign vessels once succeeded in extending a strong rope net of some sort round a rock and then proceeded to kill everything upon it. The story at least points to some very complete system of destruction put in operation by these energetic foreigners. Without doubt we have arrived at a critical epoch in the history of our seals. They are once again extremely abundant, and wise regulations, framed without loss of time, may save an interesting inhabitant of our seas and protect a valuable industry as well.

Mr. BERNARD SHAW stated that the mutton birds are protected by existing regulations all the year round, excepting from March to May. The proposal now is to protect the young birds and stop the destruction of the eggs. This will be met by the new regulations. Birds sitting and feeding their young must also not be taken. With regard to seals, the regulations which have been in existence since 1891 expired on July 25th. The Commissioners of Fisheries have not yet been able to bring the new regulations into force, but he hoped that when they were in force they would be in operation for a long time. Fur seals only were protected, and of those the females were entirely protected, as were the young under 10 months. The regulations would be made to apply to Macquarie Island, so as to strengthen the hands of the New Zealand Government, who protected seals in their own waters, and when they discovered skins suspected to be "poached" they were told the seals were captured on Macquarie Island.

Mr. A. MORTON also spoke on the subject, and pointed out that the Tasmanian fur seal, though not so valuable as the Alaska species, was the true fur seal of commerce. There was no reason why the seals should not return in the great numbers of early days so soon as they were protected. The sealer had no better friend than Mr. Bernard Shaw, while the industry itself could be developed into a very important one. It should not be overlooked that the protection of the seal was helping the half-caste.

ADDITIONS TO THE MUSEUM.

Mr. MORTON laid on the table a number of interesting curios sent by Rev. John Chalmers from New Guinea and the Fly River district, which included a drum, bone daggers, stone axes, and other articles. A very fine pair of horns of an Indian bison, presented and shot by Colonel Cox, was also inspected by the Fellows. Colonel Cox gave some interesting particulars of the animal under discussion, and stated that its habitat was in the Sheveroy Hills, Madras Presidency, where he had shot similar animals, and bagged one of the best pair of horns ever taken in India.

The proceedings concluded with votes of thanks to the readers of papers, the donors of the additions to the Museum, and the Chairman.

SEPTEMBER.

The monthly evening meeting of the Royal Society of Tasmania was held at the Society's room, Museum, on Tuesday, September 12th. Hon. C. H. Grant presided, and there was a good attendance. Apologies were received from the Hon. Sir Jas. Wilson Agnew, K.C.M.G., M.D., M.E.C., and Mr. Jas. Barnard, Vice-Presidents.

PROTECTION OF NATIVE FAUNA.

A letter was received through the Premier (Sir Edward Braddon) from the Australasian Association for the Advancement of Science, Adelaide, enclosing the report of the committee appointed to make recommendations for the protection of native fauna, and asking that Tasmania would assist in carrying out the recommendations of this committee. Among other suggestions, the report urged that the Schouten Main (Freycinet Peninsula) should be set aside as a national park for Tasmania, that the Victorian and Tasmanian Governments should be requested to draw up a joint Act for the protection of the Cape Barren goose on those islands on which it is found in Bass Straits; that existing game laws should be strictly enforced, and that in all Game Acts provision should be made for the proclamation of districts, comprising both Crown lands and private property, wherein particular species may be absolutely protected for indefinite periods.

The SECRETARY (Mr. A. Morton) said that this communication and report had been submitted to Mr. Bernard Shaw, who had dealt with the points raised. Concerning the recommendation that Freycinet Peninsula and Schouten Island should be used as a national park he (Mr. Shaw) had received opinion from Mr. John Meredith, of Cambria, Glamorgan, who considered that while the Peninsula was unsuitable for a national park, owing to its geological formation, etc., Schouten Island would be a suitable spot. With regard to the protection of the Cape Barren goose and the mutton bird, these birds were already protected by Acts of Parliament in Tasmania, and the inhabitants of the islands were generally credited with obedience to the provisions of the game laws, and the constable stationed there exercised supervision over them. The suggested provision for absolute protection of certain species by proclamation for indefinite periods already existed in Tasmania as regarded native game birds, but not as regarded animals.

Bishop MONTGOMERY said that there were a great many mutton birds in the Straits, and not long ago he had seen a large number of Cape Barren geese there. On the whole, although some instances of ruthless slaughter occurred, the Cape Barren geese were being well protected. He favoured Cape Portland as a place where the native fauna of the colony could be preserved.

Mr. MORTON complained that although there were close seasons certain birds ran a risk of being exterminated by their wanton slaughter by so-called sportsmen.

The CHAIRMAN considered that the birds of the island were very well protected. As regarded the animals, he did not see how they could be preserved in a park unless of a very large area, as some of them preyed on others. However, it would be as well to keep the matter before them, and if an opportunity occurred they might obtain land for a national park.

PROTECTION OF THE FUR SEAL.

The SECRETARY, after apologising for the absence of the president of the Fisheries Board (Mr. M. Seal), introduced the matter of the

protection of the fur seal in Bass Straits and Macquarie Island, and said that the Government of Tasmania had unfortunately decided that there should be no close season for these animals.

Bishop MONTGOMERY was sorry that the Government should have arrived at such a conclusion, for unquestionably if there were no close season there would not be a seal left in two years time. On the score of humanity and for the preservation of the sealing trade, some protection was necessary. The islanders were in favour of a close season of about 10 weeks. He moved,—"That the following be a deputation to wait on the Chief Secretary *re* the protection of the fur seal:—Sir J. W. Agnew; Messrs. C. H. Grant, M. Seal, A. G. Webster, Curzon Allport, and the mover."

Mr. F. J. SALIER seconded, and the motion was agreed to.

ORTHOGRAPHY OF GEOGRAPHICAL NAMES.

Mr. T. STEPHENS drew attention to a circular which the Government had received from the Royal Geographical Society of England on the orthography of geographical names. The circular advocated the adoption of a system of orthography for place names which would be simple enough for any educated person to master with the minimum of trouble, and which would at the same time afford an approximation to the sound of a place-name such as a native might recognise. No attempt would be made to change names which had acquired an established standing, but it was considered that in new names it would be better for the appearance of the words to give some idea of the pronunciation. As far as Tasmania was concerned, very little attempt had been made in the early days to preserve the native names, and the few there were seemed to have been selected at haphazard from a vocabulary without reference to their suitability to the places to which they were applied. He believed, however, that the Lands Department had taken some pains to make a collection of native names which would be applied to new places which might arise. He thought it would be as well for the Society to assist in every possible manner the object of the Royal Geographical Society, and moved,—"That a committee be appointed to consider and report on the circular issued by the Royal Geographical Society of England as follows:—Sir J. W. Agnew; Messrs. J. B. Walker, C. H. Grant, Bernard Shaw, and the mover, with power to add to their number."

Mr. B. SHAW seconded, and the motion was agreed to.

VOYAGES TO PAPUA.

Mr. J. R. MCCLYMONT, M.A., read a paper on "Early voyages to Papua, 1511 to 1545," which he illustrated by references to a map of the world and other charts. The paper treated the subject exhaustively, and was closely listened to.

Owing to the lateness of the hour, Mr. Robert Henry's paper on a new method of dropping the time ball was postponed till the next meeting of the Society.

The CHAIRMAN having briefly thanked Mr. McClymont for his paper and gentlemen for their remarks, the meeting closed.

OCTOBER.

There was a large attendance of Fellows and visitors at the Royal Society meeting held on Tuesday, October 9th, in the Art Gallery, under the presidency of Sir Lambert Dobson. Apologies for absence were read from His Excellency the Governor, Hon. Sir James Wilson Agnew, K.C.M.G., M.D., M.E.C., and Mr. James Barnard. Messrs. B. T. Solly and L. Cockhead were elected Fellows.

A NEW METHOD OF DROPPING THE TIME BALL.

Mr. ROBERT HENRY, in reading a paper on "A new method of dropping the time ball," referred briefly to the existing means for letting Hobart know when it is supposed to be 1 o'clock. In his opinion, provided the arrangements were all in good working order, the present method should be effective. But to ensure absolute accuracy it was desirable that the process should be automatic as far as possible, and with this object in view he submitted a scheme for dropping the ball, and also firing the gun electrically. He described the details, and acknowledged indebtedness to Captain Parker, R.N., for the idea as to the manner for releasing the time ball. Various other appliances were in use, but this should commend itself for simplicity and inexpensiveness. The present mode of signalling the time throughout the colony gave all that was desired, and should not be disturbed, but the time ball arrangements should be separate and distinct. It would be more advantageous to use a special clock for the signalling instead of doing it by hand. Mr. Henry concluded his paper by conducting an interesting experiment, which consisted of firing a toy gun and dropping a model time ball by electricity, the Chairman applying the current.

Mr. KINGSMILL (Government Meteorologist) said that something more important than signalling was to first of all get the right time. Supposing the ball to be dropped and the gun fired electrically, if there was an error it would be brought home to him. There could be no third party. But he thought he was at liberty to mention that ere long there would be, through the generosity of a citizen, a better means of obtaining correct time than at present. Mr. David Barclay had very kindly placed his clock, known to be the best in the Southern Hemisphere, at disposal to be connected electrically with the Observatory. With liberty to read Mr. Barclay's clock alongside the present instrument in cloudy weather, when it was often and for lengthy periods impossible to take observations, a better standard of time might be looked for in the future. When this was done he would not be afraid to see electric signalling established.

PRIMITIVE THEORIES OF POLITICAL TEACHING.

Dr. W. JETHRO-BROWN, M.A., LL.D., read a paper on "Primitive Theories of Political Teaching," in which he attempted to answer the questions of what was the earliest theory of political duty, and at what stage in tribal history was the theory evolved ?

Mr. MAULT and Rev. Dr. SCOTT expressed surprise that in his paper Dr. Jethro-Brown had not mentioned the patriarchal origin o authority.

Dr. JETHRO-BROWN, in reply, said that the point was one that had been very elaborately discussed in a large number of works. At present, so far as investigations went, the patriarchal theory, as far as the Aryan races were concerned, was better than any other advanced. But we must distinguish between theories of the origin of society and theories of the origin of political duty. Until we got beyond the family we could not have the idea of political duty.

THE HARTZ MOUNTAINS.

Mr. J. W. BEATTIE read some "Notes on a recent trip to the Hartz Mountains," descriptive of a photographic tour through the bush from Geeveston to the summit of the mountains. The paper was elaborately illustrated by lantern slides, manipulated by Mr. Nat Oldham, and the audience was given an excellent, interesting, and general idea of the scenery, lake and mountain, bush and plain. Mr. Beattie considered that the Hartz Mountains were likely to become popular as a tourist resort for three reasons: (1) They are easily accessible; (2) every mile of the route from Hobart to the mountains is full of interest and beauty; (3) they comprehend every phase of tourist enjoyment.

Mr. R. M. JOHNSTON proposed a vote of thanks to Mr. Beattie, whom he thought had done more than anybody else to give the world an idea of the beautiful scenery of Tasmania.

Hon. HENRY DOBSON, M.H.A., supported the motion, and suggested that Mr. Beattie should deliver his paper as a lecture again in the summer when the city is full of visitors.

The vote of thanks was extended to the readers of other papers and to Mr. Oldham, and carried with acclamation.

1895.

MAY.

The first meeting of the 1895 session of the Royal Society of Tasmania was held in the Art Gallery, Museum, on Tuesday, May 20th. There was a very large attendance, Sir James Agnew occupying the chair in the absence of His Excellency the Governor, who had a prior engagement.

PAPERS.

The following papers were taken as read:—

"NOTES ON A MINERAL SUBSTANCE NEW TO TASMANIA," by Mr. W. F. Petterd:—During a recent visit to the Zeehan silver-field my attention was drawn to a peculiarly coloured and unusual form of pyrites occurring in one of the silver-lead lodes on the property of the Silver Queen Prospecting Association. It is found in some quantity, both massive and disseminated, closely associated with various other forms of pyrites and richly argentiferous galena in a portion of this particular lode, locally known as "Clarke's Tribute." In colour it is of an unusual greenish grey with a bronze-like highly metallic lustre, but is sometimes inclined to brass yellow from extreme admixture of chalcopyrite. It is very brittle, with an uneven fracture. Its hardness is about 4, of the scale; specific gravity, 4·5. Upon a qualitative analysis by the wet process, and examination with the blowpipe, the substance proves to be a rare mineral known as stannite (a sulpho-stannate of iron and copper), or chemically, 2 Fe, Su S2+2 Cu S, Sn S2=S29·77; Cu 29·77, Sn 27·44, Fe 13·02=100. The mineral is commonly known as "tin prites," or "bell-metal ore," and is almost peculiar to the stanniferous districts of Cornwall, England, being only rarely found out of its original locality. It has been reported to occur in Bohemia, at Zinnwald, in the Erzgebirge, with blende and galena. In Australia it is reported to occur in extremely limited quantity in the tin districts of New South Wales and Northern Queensland. The finding of this mineral in association with silver-lead is quite unexpected, and very interesting from a scientific point of view, more especially as it is in itself of a high argentiferous value, which is quite a new feature with this chemical compound. I am informed by Mr. J. G. S. Stitt, of Zeehan, that its average silver value is about 90oz. per ton, and that it is readily purchased—mixed with other minerals—by the local ore-buyers. Numerous analyses of stannite from Zinnwald and Cornwall give a metallic tin value of from 25·81 to 31·62 per cent., the copper varying from 23 55 to 30·0, but I am not prepared with information as to the metallurgical value of either metallic constituent as occurring in chemical association. I have submitted samples to Professor G. H. F. Ulrich, of the Dunedin University, who writes, under date March 30, 1895:—"The sample of ore is stannite, or bell metal ore, as you supposed. Our lecturer in metallurgy and assaying, Mr. Fitzgerald, made a rough quantitative analysis of the ore, the results of which fall also within the range of the analysis given for stannite in Dana's 'System of Mineralogy.' Its colour, streak, hardness, and indistinct cortical cleavage are also in agreement with those given for the mineral. If the ore occurs in any quantity the respective mine owners would, I think, be wise in getting it picked out for separate sale, with the object of having its contents in copper and tin taken into account in the sale price in addition to

the per cent. of silver.' The sample sent with this note is one of many collected by Mr. Stitt and myself from the ore heap at the locality mentioned. Will you please add this to the Museum collection.

"NOTES ON FURTHER PROOFS OF GLACIATION AT LOW LEVELS," BY MR. T. B. MOORE, F.R.G.S.—After referring to an extract from a letter to himself from Professor R. V. Lendenfeld, of the University Czernowitz, relative to and agreeing with a previous paper on the first proofs of land glaciations in Tasmania, the writer said that upon examination of the banks of the King River, West Coast of Tasmania, he had discovered large ice worn boulders, striated and grooved, in the deep gorge of the river situated at the upper landing, and also similar glaciated boulders in Harvey's Creek, at a distance of a quarter of a mile from its junction with the King River at the landing. The boulders were large, many tons in weight, and composed principally of silurian sandstone, and the distinctness of the planed surfaces, grooves, and striæ was a conclusive proof that the period of the transposition by the ice was of very recent (comparatively) date. These blocks were at an altitude of not more than 100ft. above the sea level. In the same locality, on the southern bank of the river, 150ft. above its bed, was a large moraine, composed of rocks brought from the inland mountains, probably at the beginning of our glacial period. During the recent substantial improvements to the Strahan-Lyell-road, a very interesting phenomenon of the glacial action had been exposed through the accumulation of rubbish and moss being removed from the cuttings and drains of the road. A full description of this phenomenon was given, and as it was accessible on the way to the greatest mine in the Island, which many scientists and geologists were sure to visit, it was to be hoped that more able men than the writer would give their views as to its age, origin, and nature. Illustrative specimens from this last discovery were exhibited.

"Notes on some new fossil plants to Tasmania," by Mr. R. M. Johnston, F.L.S., and "The Botany of the Hartz and Adamson Ranges," by Mr. L. Rodway.

AUGUST.

The usual monthly meeting was held on Tuesday, August 10th, Mr. T. Stephens, M.A., F.G.S., Vice-President, in the chair.

The SECRETARY (Mr. Morton) read apologies from Sir James Agnew Colonel Legge, and Messrs. James Barnard and A. G. Webster.

ORIGINAL RESEARCHES.

The SECRETARY read a communication from the Royal Society, New South Wales, offering its medal and £25 for the best communication containing results of original research or observations upon scientific subjects, to be sent in by May 1, 1896, and May 1, 1897.

TIMBER FOUND BENEATH ALLUVIAL DRIFT.

The SECRETARY read a paper by Colonel Legge, R.A., on "Timber found beneath Alluvial Drift at Swansea," abridged as follows:—Driving from Bicheno to Swansea travellers crossing the Lyne Sugar Loaf Range come suddenly in view of the large level tract of country lying south of the hills stretching from Cranbrook towards the ranges bounding St. Paul Valley on the east. This tract is mainly formed by the coast range, from St. Patrick Head to Bicheno, suddenly swerving inland at the latter place, and joining the highlands east of St. Paul, lying some distance from the East Coast. About Swansea the ranges approach the coast again, following the shore southwards. The country thus hemmed in is alluvial, forming what may be styled the basin of the Swan River, the Cygnet, and the Wye. On existing maps these mountain features scarcely appear. The surface of this basin is mostly level, with occasional gentle rises of about 100ft. The soil is chiefly dark chocolate, apparently the result of denudation and drift from the extensive valleys on the highlands at the back. On the Cambria estate, lying mainly at the foot of the "Lookout," locally the soil is rich and deep; and on that portion between the main road and Oyster Bay is an extensive lagoon, which seems in former times to have joined the Meredith River by an extinct water-course, visible in the form of a sinuous depression, on the course of which a deep dyke has recently been cut by Mr. Meredith to drain the lagoon. In its shallowest part this ditch attains a maximum depth of about 12ft., and it was at the bottom the log was found across the drain. The wood is almost black, like Irish "bog oak," resembling ebony in texture. When cutting the sawdust was very fine. From its appearance the wood is probably one of the eucalyptus; if so it throws an interesting light on the antiquity of this genus, as it must have been buried many thousands of years. Where the log was met with, the first 3ft. or 4ft. consisted of chocolate soil, merging into a yellowish clay loam, deepening again about 10ft. into peaty substance. Further up the dyke a thick bed of shingle, intermingled with stones of rounded form about as large as a mouse's head, took the place of clay. This was probably the bed, while the bottom, where the log was found, was no doubt muddy. Towards the lagoon the material excavated is dark peaty soil, continued to the edge of the necross. From the whole appearance of the surrounding land the alluvial deposit is one of great age, rendering the discovery of great interest, not only on account of its antiquity, but in connection with the capability of the particular species of tree to withstand decay throughout such a lengthened period.

Mr. R. M. JOHNSTON said he had examined the wood superficially; he would not, however, be prepared to say what it was unless by a microscopic examination. It was a highly lignified specimen, and he had met with similar woods on the West Coast. Woods of this kind commonly occur in drifts in other parts of the colony.

THE FAN-TAILED CUCKOO IN TASMANIA.

The SECRETARY read the following paper, also by Colonel Legge, on finding of a fan-tailed cuckoo in Tasmania, in which it was stated that the writer observed a beautiful adult example of *Cuculus flabelliformis* (fantailed cuckoo) near Apsley, East Coast, the country passed through being gum, she-oak, and Oyster Bay pine bush; the cuckoo lodged on a branch by the road side, affording a good view of its plumage. Such a late occurrence of this migrant was worthy of record; it was improbable that it would winter here; for several summer visitants have been observed in this sheltered region late into the winter, and this cuckoo probably made a prolonged sojourn through the mild climate. *Cuculus flabelliformis* inhabits most parts of the continent, from Cape York to Victoria, and westward to West Australia, and far inland beyond the Murray. It arrived here about the end of September or beginning of July, and left at the end of March and throughout April. Mr. O. Adams saw one at Piper River on July 24, 1887.

SOUTHERN STONE PLOVER.

The SECRETARY read some notes upon the discovery of the Southern stone plover (*Ædicnemus grallarius*) in Tasmania, in which he showed that the bird had a very wide distribution over the Australian Continent. The body is nearly the size of that of a hen pheasant, and the flesh of excellent eating. The habits of the bird resemble those found in Ceylon. It inhabits sandy plains, crowns and sides of grassy hills and flats, between the mountain ridges particularly. Occasionally it is met with in pairs, and sometimes in small flocks. It is shy, and runs with great rapidity, but when not inclined to fly it squats down on its legs by the side of a stone or log, and remains so close to it that it may be almost trod upon before rising. One of the birds was sent by Mr. McCluskey, Spring Bay, and the other by Mr. F. Morris, Swansea. The bird was excellent for the table, and he trusted it would increase and multiply. The plumage of the specimens submitted would seem to indicate that they were in too good a condition to have been blown over.

Mr. B. SHAW, who had shot over every inch of the country where the birds were taken, said he did not remember having ever heard of or seen the plover under discussion.

PROOFS OF GLACIATION AT LOW LEVELS.

The SECRETARY, for Mr. T. B. Moore, F.R.G.S., read a paper on this subject, based on observations made by him on the King River, between Pine Cove and Strahan, where he found large ice-worn boulders striated and grooved in the deep gorge of the river near the upper landing. The boulders were composed principally of silurian sandstone; the planed surfaces, grooves, and striæ were fairly distinct, proving beyond doubt that the transportation of the boulders by ice was of very recent date.

Mr. R. M. JOHNSTON said on a future occasion he would take an opportunity to give his reasons for not accepting the conclusions arrived at by Mr. Moore. He read a few notes which he himself had made on discoveries of evidences of glaciation in Tasmania by geologists over 20 years ago.

NEW GUINEA STONE ADZES.

The SECRETARY submitted six stone adzes, which, he said, were the finest specimens he had ever seen. They were of a kind of greenstone,

the heaviest being 10¾in. in length and 10½in. in girth. The adzes were from the Fly River, New Guinea, and were presented to the Museum by the Rev. James Chalmers with other valuable and interesting ethnological specimens.

COMPLIMENTARY.

The CHAIRMAN, in moving the customary votes of thanks to the writers of the papers submitted, took the opportunity of commenting upon some of them. Regarding the specimen of wood submitted by Colonel Legge, he said he would not be at all surprised to find that it was some resinous sort of pine and not a eucalypti. The ornithological papers by Colonel Legge and Mr. Morton were most interesting to lovers of natural history. Mr. Moore also deserved the thanks of the Society for his paper, which was valuable, considered as the result of careful observations.

The meeting then concluded.

SEPTEMBER.

The monthly evening meeting of the members of the Royal Society of Tasmania was last held on Monday, September 7th, in the Art Gallery of the Museum. A lecture on "The Primary Law of Value or Price," by Mr. R. M. Johnston, F.L.S., Government Statistician, was given.

Mr. Bernard Shaw presided, and among those present were :—The Treasurer (Hon. P. O. Fysh), Messrs. F. W. Piesse, M.L.C., N. E. Lewis, M.H.A., Henry Dobson, M.H.A., Rev. J. B. W. Woollnough, M.H.A., etc.

The SECRETARY (Mr. Alex. Morton) read a letter from His Excellency's private secretary, intimating that owing to domestic bereavement Lord Gormanston was unable to attend. Letters of apology were also read from Sir James Agnew, the Premier (Sir Edward Braddon), the Minister of Lands (Hon. A. T. Pillinger), Hon. T. Reibey, M.H.A., and Mr. Mackenzie, M.H.A.

The CHAIRMAN having formally introduced the lecturer,

Mr. JOHNSTON first spoke of the proper use of economic, terms. Under the generic term "wealth" there was exchange wealth, social wealth, national wealth, cosmopolitan wealth, capital wealth and consumable wealth. Many used the term "wealth" in a loose way. In the same way there was individual capital, consumption capital, fixed capital, auxiliary capital, potential capital, circulating capital, and personal capital. Then there was utility—total utility and marginal and final utility. Under "value" there were such expressions as price or exchange value, money value, unit of value or ratio of exchange, economic price, present value, deferred value, capital value, and annual value. Under "rent" there was ground and building rent, producer's rent, ability rent, wage-earner's rent, economic rent, and quasi-rent. "Under price"—economic price, equilibrium price, monopoly price, loan price, fancy price, famine price, robbery and violence price. Then under "wages" were nominal or money wages, and a more important thing—rent wages, or purchasing power. He expounded the proper applications of these terms. There was the primary law of value or price, and that was the subject of his discourse. He argued that economic cost of production (and not the illusive and indefinite something called the ratio of demand and supply), was the primary law which regulated and determined the respective ratios and prices at which the precious metals and all other commodities and services exchanged with each other. The "scarcity of gold" theory of the decline of prices could not be reconciled with plain facts, for the decline of 58 per cent. in cotton cloth was conjoined with an increase of 112 per cent. in the wages of the operatives since 1847. The fall of 58 per cent. in prices was likewise irreconcilable with the ratio of demand and supply theory. Cheapened cost of production, the true primary law of economic price, was the only theory which harmonised with all the facts. Theories as to the scarcity of gold or the appreciation of gold and ratio of demand and supply, which could only at best be reconciled with a very small part of the facts, must be abandoned as unsatisfactory and altogether misleading. Supply was subordinate, and depended upon demand, whilst the cost of producing the supply was the primary law which determined its economic price. Then if it be true that cost of production was the true primary law of economic value or price, it might be confidently asserted that any attempts made by Governments to fix arbitrary laws for determining the relative exchange values of any commodities (such as gold and silver in the scheme of bimetallism) would be as futile as to pass arbitrary laws for determining the absolute specific gravities. The true

cause of decline in prices was due to the increasing improvements in steam, chemistry, and labour-saving machinery. He concluded by quoting the author of "Recent Economic Changes" (Mr. David A. Wells) in saying that "to suppose now that a change in the relative value of the two precious metals (gold and silver), a change which has not in any degree restricted their natural supply or diminished their monetary or industrial use, has exercised a concurrent, superior, and predominatory iufluence in respect to the prices of all other commodities or services, would seem to be almost incompatible with the clear exercise of one's reasoning faculties."

The address was illustrated by a number of cleverly-prepared diagrams.

Mr. FYSH characterised the paper as a most able and elaborate dissertation, and one which would be classified and appreciated among scientific papers of the kind throughout the world. If, however, chey found that the primary law of value or price was the economic cost of production, many of them would have to turn themselves inside out in regard to their settled theories.

Mr. WOOLLNOUGH felt doubtful as to the results Mr. Johnston had arrived at, whilst still having great confidence in his talent in such matters.

Dr. BENJAFIELD wanted to know whether to-day it was taking double as much labour to produce a ton of gold that it did 20 years ago?

Mr. JOHNSTON: No; it's just stationary. It's the cost of producing silver that has reduced.

Dr. BENJAFIELD insisted that gold was produced to-day cheaper than ever, and in larger quantities.

Mr. JOHNSTON: The quantity does not settle its cost.

Mr. FYSH thought that there Mr. Johnston's difficulty came in.

Dr. BENJAFIELD remarked that the purchasing power of gold was higher to-day than it had been known to be for many years.

Mr. JOHNSTON dissented.

Further discussion on the paper was adjourned.

It was desired by several that the paper should be printed, and Mr. MORTON appealed to the Treasurer to have it printed in the Government Printing Office.

A vote of thanks to Mr. Johnston was then passed, and the CHAIRMAN, in moving it, expressed regret on behalf of the Society for the cause which had led to the absence of the Governor. He also referred to the recent visit of Mr. Wragge, and the marvellously accurate forecasts of the weather which that gentleman had recently given.

OCTOBER.

At a meeting of the Royal Society of Tasmania on Monday, October 21, discussion was resumed upon Mr. R. M. Johnston's paper on "The primary law of value or price," which was read at the previous meeting of the Society. The Hon. Sir James Wilson Agnew presided, and there was a good attendance of ladies and gentlemen, among whom were the Hon. P. O. Fysh, Mr. Justice Dodds, Hon. Adye Douglas, M.L.C.; Bishop Montgomery, and Hon. C. H. Grant, M.L.C.

MRS. MEREDITH'S WATERCOLOURS.

The PRESIDENT, in opening the meeting, mentioned that an effort was being made to secure Mrs. Meredith's watercolour drawings of Tasmanian fish, flowers, shells, etc., and to present them to the Society. Considerable amount of success had already attended the effort, but more money was still needed for the purpose, and if any public-spirited individual could afford to help, the members of the Society would be very grateful. The paintings were on view downstairs, and he advised those present to inspect them before they left the building.

APOLOGIES.

The SECRETARY (Mr. A. Morton) read letters of apology from His Excellency the Governor, Hon. J. Henry, Messrs E. Hawson (secretary of the Chamber of Commerce), T. E. Hewitt, James Whyte, and James Barnard, senior vice-president.

MR. JOHNSTON'S PAPER.

The CHAIRMAN said he had repeatedly read Mr. Johnston's pamphlet, and thought he had clearly proved his case—that the cost of production regulated the price.

Mr. A. J. OGILVY said he thought the thanks of the whole community were due to Mr. Johnston for having so ably brought the subject forward. He (the speaker) was not going into any particular application of the principle—bimetallism or anything else—for it was no good to go into the application until it was settled whether the principle was the true one. Mr. Johnston's opening statement when condensed was that the cost of production, not demand and supply, primarily determined prices. Later he qualified that by excluding things the cost of which was determined by scarcity alone, confining it to things which could be increased indefinitely, and where competition operated without restraint. That price would always represent cost of production measured in labour if there were no natural scarcity or artifical interference Mr. Johnston had proved conclusively, but the case thus qualified seemed so plain from the mere statement of it that one was surprised to hear that it required proof. The ratio between demand and supply as such was the sole governing power of the movement of prices, notwithstanding that behind demand and supply was cost of production. The doctrine of demand and supply was that the value of everything was determined by its scarcity, as compared with the demand for it. If there was no demand for it it would have no value, no matter how scarce it might be. However, let them keep to the main point, which was that looking at the matter broadly and taking price as a whole as it actually was with all its disturbing influences, not as it might be without them, it was demand and supply as such that determined it, cost of production acting only by affecting supply and so disturbing the ratio, besides being only one factor out of many, though no doubt the chief one, in affecting supply.

Mr. FYSH said he had read Mr. Johnston's paper twice. When he first read the pamphlet he was disposed to dissent, but when he had read it again and had studied it more fully he asked—"Who questions it?" For so clear was it to him that the primary law of value or price was the economic cost of production that it seemed outside of argument. All they had to do was to follow the phraseology of the writer—"the primary law of value or price." There was "value" and "price," and value and price with the writer were the same thing. Therefore the primary law of value (leaving out price) must be the economic cost of its production. And the more they thought it out the more surely they arrived at that conclusion, and yet not break down the experience as to the law of supply and demand. As to gold, he was not so able to follow Mr. Johnston's argument. They could not make an artificial price of it.

Mr. JOHNSTON: Gold is measured by itself.

Mr. FYSH: Measured by an arbitrary standard of value. And if the output was so reduced that it could not be overtaken, we would be obliged to fall back on some other mineral, such as bismuth, and which is more scarce than gold at present. Gold was, after all, only a matter of exchange—a convenience for exchange and measure. The more he read the more he was convinced that Mr. Johnston was right with respect to the law of value and price. Take wheat and meat for instance. That he demonstrated by facts. The thing was to limit themselves to his terms, and then they had only to ask themselves—"Who is going to question it?" The law of supply and demand was quite separate from the law of economic cost of production.

Hon. ADYE DOUGLAS said he had come to learn, not to instruct, not having had time to dip into the subject. With regard to the economical production theory put forward they must all agree to that. So far as he had been able to read the pamphlet, he quite agreed with Mr. Johnston.

Hon. C. H. GRANT said he had only cursorily read the pamphlet, but was inclined to agree with Mr. Johnston's demonstration that the primary law of value and price was the economic cost of production. As to wheat, notwithstanding the increased demand and supply, the cost had been enormously reduced, and that was accounted for by the increased facilities of transit—steam and the triple expansion engine.

Mr. JOHNSTON: That has largely accounted for it—also the reaper and binder.

Mr. GRANT: Thus value and price are determined by economic cost of production. The same principle applies to the reduced cost of meat.

Dr. BENJAFIELD, in a lengthy address, said there was no question that in the early state of society the cost of production was the value, but we live in different times now, and all that had changed. Ricardo, Adam Smith, and others were superseded by the opinions of up-to-date men. Mr. Johnston had told them that "gold was our established foot-rule for measuring value, and the standard of itself could not show any variation"; again, that the falliug of prices could not be due to the appreciation of gold. All that seemed to him (Dr. Benjafield) to be fallacious. Professor Nicholson, of Edinburgh, one of the leading authorities in Britian—[Mr. JOHNSTON: "He is not the best"]—said it was impossible to take labour as a unit of value. Wells, whom Mr. Johnston had quoted with a flourish of trumpets, as a modern authority, said prices were controlled by supply and demand; that when production was checked prices advanced. [Mr. JOHNSTON: I agree with that.] Mr. Johnston had told them that the quantity of

gold did not regulate prices; that the scarcity of gold had nothing to do with prices. Mill said that if the whole money in circulation was doubled prices would be doubled. Giffen, a greater authority than Ricardo—[Mr. JOHNSTON: He was not a political economist]—showed that the alterations in value and prices were due to the scarcity of gold; that the gradual adjustment of prices must be subject to the gradually smaller supply of gold; that a fall in prices implied a contraction in money, but Mr. Johnston laid it down emphatically that it was not so. [Mr. JOHNSTON: Certainly] Professor Foxwell, of Cambridge, said: "There can be no question that where the value of money has risen the price of commodities has fallen." Giffen said that banking facilities did not meet the difficulty, and did not compensate for a scarcity of gold. Saurbeck said that a great increase of production and an insufficient supply of gold were the causes of lower prices.

Mr. Justice DODDS rose to a point of order. He thought gold should not be considered as gold, for the purposes of the discussion, for gold had a fixed standard that was simply used as a medium of exchange. Mr. Johnston's paper dealt with the primary cost of the production of commodities, and that had not a fixed standard.

The CHAIRMAN: That is the point.

Mr. JOHNSTON: Hear, hear. This is bordering upon the question of bimetallism.

Dr. BENJAFIELD (proceeding) said that Professor Nicholson ridiculed the idea of gold being a foot-rule, as the value of a sovereign was changing frequently. Mr. Johnston had said that the fall of silver was due to cheapened production. Giffen said that its purchasing power was greater than ever, and had not really fallen at all. They should speak of silver as appreciating a little and gold a very great deal. They would find that what had occurred to silver had occurred to gold. The cheaper means of abstraction of gold had also been very great. Last year's output was the largest, yet its purchasing power had doubled within 20 years,

Mr. FYSH: Why do you argue it is scarce? Is it scarce?

Dr. BENJAFIELD said it was scarce in the banks.

Mr. FYSH referred to the millions lying idle in the banks.

Dr. BENJAFIELD said that gold appreciation had occurred through legislative interference, and silver had failed to equally appreciate through the same cause.

After Mr. WOOLLNOUGH, M.H.A., had offered some observations, the discussion was adjourned for a week.

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At an adjourned meeting of the Royal Society of Tasmania on Monday, October 28th, Sir James Wilson Agnew, K.C.M.G., M.D., M.E.C. (Vice-Fresident) occupied the chair, and there was a good attendance of both ladies and gentlemen. The meeting had been adjourned until this evening to further discuss Mr. R. M. Johnston's paper on "The Primary Law of Value or Price."

DEATH OF MRS. MEREDITH.

The CHAIRMAN, upon taking the chair, said:—Ladies and gentlemen,—Before we proceed to business I have to say how sorry I have been to hear this afternoon—and I am sure you are very sorry too—of the death of Mrs. Charles Meredith. Mrs. Meredith has been a distinguished resident of Tasmania and a hon. member of this

Society for many years. She died to-day in Melbourne. You will recollect that the last time we met I brought under your notice some of her works which it is very desirable should be secured for the Society. They consist of books and pictures of shells, animals, and flowers. They have been on view downstairs, and several people have been to see them. Now they are up in this room (the Art Gallery), and perhaps after this meeting is over some who are present would like to inspect them. The works are bound in the best style, as all her works are, and now by the intelligence of her death a melancholy interest is attached to them.

NEW MEMBERS.

The Hon. Thos. Reibey, M.H.A., and Mr. J. G. Mitchell, of Jericho, were balloted for, and unanimously elected members of the Society.

LETTER FROM MR. WRAGGE.

Mr. Clement L. Wragge wrote from the Chief Weather Bureau, Brisbane, as follows :—

My Dear Morton,—This letter is an official one to you as secretary to the Royal Society, and I will beg you to read it before the Fellows. I must confess that I am much disappointed that the Government of Tasmania have not voted the funds necessary to continue the maintenance of the new meteorological service of Tasmania; but I learn at the same time, with sincere gratification, that it is proposed to hand over the local direction of the Tasmanian weather service to your Society. I am sure that the interests of this service will be jealously and safely guarded by your august body, and that your Society will do its utmost to take such steps as may be necessary to maintain, not only the observatories at Hobart and on Mount Wellington, but also the out-stations in different parts of the island. Of course, it was on the distinct understanding that these stations are maintained, or to put it in other words, that data are forthcoming from these stations, that I undertook to cable daily to Tasmania, without any expense whatever, the forecasts issued here for your island. It will at once be evident that if the Tasmanian stations cannot be kept going, the forecasts cannot possibly be up to the present standard of accuracy. I have reason to believe that they have already been found of considerable practical utility, and it will be most deplorable in public interests if the present efficient service cannot be kept afloat. I would therefore earnestly commend the Meteorological Department of Tasmania to the special care of your Society, and feel sure that you will recognise in Mr. Kingsmill, as Government Meteorologist for Tasmania, one who has thoroughly the interests of his department at heart, and do what you can to assist him in these important duties. I am pleased to hear that the country has, at last, determined to recompense him for the outlay he so generously expended in order to establish the coast stations and the observatory on Mount Wellington. I am leaving next week for Cape York Peninsula, and for a long and extended tour of inspection in Central and Northern Queensland generally. If you have anything important to communicate, please write or wire to me at the Post and Telegraph Office, Cooktown, N.Q., until further notice ; but should you have communications that can be dealt with during my absence, please address my first assistant, Mr. Archibald W. Anderson, Chief Weather Bureau, Brisbane. Mr. Anderson will issue the forecasts during the time I shall be away from here. He has been specially trained by me, and I have every possible confidence in his work, Please convey my respectful regards to Sir James Agnew, your vice-president, the members of your Council, and the Fellows of your Society.

The letter was received.

THE PRIMARY LAW OF VALUE OR PRICE.

Mr. W. Knight, M.A., barrister-at-law, resumed this discussion upon Mr. Johnston's paper by reading a paper in which he criticised Mr. Johnston's views very strongly. Mr. Johnston, he contended, took an extreme view of the principles of the value and the use of gold. The demand for gold was never kept pace with. It had a monopoly value, and therefore Mr. Johnston had not sufficiently taken into account the value of capital.

Mr. J. W. ISRAEL read a paper showing that he was in agreement with what Mr. Johnston had advanced. He read a paper on the subject eight years ago and then came to similar conclusions. He then went into economic principles to show the evidence of the same.

Mr. THOS. TAYLOR urged there was another law besides the cost of production which regulated prices. From the fifties to 1870 prices went up, notwithstanding the cheapening of the cost of production.

Mr. A. J. TAYLOR thought speakers had not paid sufficient attention to Mr. Johnston's paper and diagrams. Dr. Benjafield and others had spoken of conditions of things which Mr. Johnston excluded. He thought Mr. Johnston had successfully set out to prove that the law of value or price regulated and determined the ratios and values of precious metals, and all other commodities, and was to be found in the economic cost of production. He thought Mr. Johnston had established that the primary law of value had to do with the cost of production.

Hon. NICHOLAS J. BROWN, M.E C., said: Taking a broad view of the subject, all over the world it seemed to him inevitable that the average prices realised for commodities must bear a distinct relation to the cost of production, and he could not understand why such elaborate calculations and diagrams were so necessary to prove it. He was, however, unable to see what practical value these assertions of Mr. Johnston were. He supposed the object was to prove that those who agitated for bimetallism were entirely in error. On that question he was not prepared to definitely commit himself; but he thought, from that point of view, Mr. Johnston seemed to have the right end of the stick, for he could not understand how giving a fictitious value to silver could have any effect whatever, unless there was an agreement to use it as such on the part of the whole of the nations of the world.

Mr. RULE did not think Mr. Johnston had demonstrated his thesis. No one would dispute that cost of production was an important factor; but on the question of supply and demand a lot was left unproved.

Mr. JOHNSTON, in reply, complained that his paper had been largely misunderstood by some of the speakers. His paper went to show that the economic cost of production, not supply and demand, was the initial element in the control of prices. He had confined himself to economic cost. He showed how the intellect of men and capitalists had lessened labour. He did not ignore capital as having helped. The dominant law was the cost of production. There must be a pivot for supply and demand to work upon—the equilibrium price; economic cost of production was the major law in controlling price. Gold could never measure itself. He denied that he had shown that cost of production meant a general decline of prices. When they took lengthened periods in their investigations they saw how the influence of supply and demand fell short. Cost of production included carriage and distribution. As to bimetallism, there was no local market for gold or silver. The world was the market. If the quantity of money determined the matter, prices of commodities should have risen, because gold had become more plentiful, and not have fallen.

A hearty vote of thanks to Mr. Johnston was passed on the motion of the Hon. P. O. Fysh.

NOVEMBER.

The monthly meeting of the Royal Society of Tasmania was held in the large room of the Art Gallery on Monday, November 25th, Sir James Agnew presiding. There was a large attendance.

Mr. L. RODWAY read a paper "On some New Botanical Specimens."

A paper from Mr. WEYMOUTH on some New Mosses.

Mr. J. B. WALKER read a paper on "Abel Jansen Tasman: His Life and Times." He said that for long Tasman was neglected by his own countrymen, but at this late date a good deal of close attention was being given to the existing records of his work. About the time of Tasman the Dutch had become the carriers of the European peoples. Powerless before their enemies on land, the Dutch took to the sea. They cut off the wealth brought by Spain from the New World, and by that means found the wherewithal to carry on the conflict. The Hollanders swept the seas, and harried the Spaniards at their pleasure. Philip forbade Dutch ships to trade with any port of Spain. But the blow fell upon himself and crippled the trade of Spain. Various attempts were made to find a shorter route to India. Baffled in their search in the North, the Dutch turned their attention to the old route by the Cape of Good Hope, and along that line acquired the practical monopoly of the great trade of the East Indies, particularly of the Spice Islands. The Dutch also took possession of Japan and Ceylon. Sir Walter Raleigh gave some most interesting figures as to the extent of Dutch trade, and the effects of Dutch maritime enterprise. Such was the position of the Dutch nation at the time of Tasman. Amsterdam was the centre of the world's trade, and the richest city in Europe. In 1603 Tasman was born, in a small inland village in a remote province of Holland. The locality was inhabited by representatives of the fine Frisian race, who differed much from the typical Dutch. Tasman was probably a Frieslander. No information concerning Tasman's family was obtainable, and nothing was known of his youth. But after an apprenticeship in the fisheries of the North Sea it was natural that he should get to Amsterdam. The first authentic information concerning him showed him living as a widower with one young daughter in one of the poorest streets of Amsterdam. Tasman married again, and made his first voyage to the East at the age of 28. His promotion was rapid; from the rank of a simple sailor to that of a master, he rose in two years. On the acquisition of the monoply of the valuable spice trade the Dutch concentrated all their energies. They succeeded—at the cost of much bloodshed and long-continued embitterment. Tasman's singular capacity soon made itself obvious to the colonial authorities, for he shortly had command of a small fleet in East Indian waters. Desiring thereafter to visit the old land, he accepted a subordinate position as mate of the ship Banda. On arrival he remained at Amsterdam for some months, when he returned to the Indies, taking his wife with him. In 1639, a year after his return to Batavia, Tasman was selected to assist in the work of discovery. Anthony Van Diemen was at that time Governor. Tasman was on service which took him to the coasts of China and Japan. Here reports again came of a golden island to the eastward. Tasman commanded one of the ships fitted out for the quest, being second in command. After long searching over a wide area the venture was abandoned, after the loss of 50 of the 90 men who made up the number of the expedition. The Dutch were very anxious at that time to discover the great south land, of which there had long been rumours. Already, before the expedition after the golden island, a Dutch ship found itself, by an error of longitude, off the coast of Western Australia. In a few years that coast was well known to Dutch mariners. Anthony Van Diemen at length fitted out an expedition

of two ships to discover the Great South Land, with Tasman in command, and Fischer, a famous pilot, second. The ships touched first at Mauritius, remaining there to refit and provision a month. They sailed, and got down to lat. 49deg. They fell off to lat. 42deg., and then struck the coast of Tasmania, somewhere near the entrance to Macquarie Harbour. Getting round to Bruny they tried to make Adventure Bay, but were driven out. Thereupon they named Frederick Henry Bay, now known as Blackman's Bay. Sailing from the coast they made New Zealand near Cook's Strait, and had an encounter with the natives. New Zealand Tasman held to be the veritable Great South Land. The Tonga Islands were next reached, and from there a homeward course was shaped past New Guinea. With the result of the expedition Van Diemen was not satisfied, but two years afterwards he again sent Tasman and Fischer out. Of that second voyage in 1644 no journal was kept. Tasman's services were recognised somewhat grudgingly by a small increase of salary. Of the rest of his life very meagre information was extant. There were no more great expeditions of discovery. Later, Tasman was suspended from his office as a punishment for executing a seaman without trial. Being reinstated after two years, he shortly afterwards left the service of the company. Of his last days little was known. He died in 1659.

Very admirable lantern illustrations were supplied by Mr. J. W. Beattie, and exhibited by Mr. N. Oldham.

A hearty vote of thanks was accorded to the lecturer.

The Hon. ADYE DOUGLAS said the very admirable lecture they had just listened to was the last of the session. Their thanks were due to the vice-president, Sir James Agnew, and in moving that a vote of thanks be accorded him he would add the name of Mr. Barnard. Sir James Agnew and Mr. Barnard had belonged to the society for 54 years.

The vote of thanks was carried by acclamation, and the recipients briefly responded.

CLOSE OF THE SESSION.

The CHAIRMAN announced that the evening's meeting closed the session for 1895. He was sure all would agree that many valuable papers had been read and much exceedingly useful information had been gathered and ventilated during the session of 1895.

The meeting then terminated.

FUR SEALING IN BASS STRAITS.

On Wednesday, September 12, 1894, a deputation, consisting of Sir James Wilson Agnew, K.C.M.G., M.D., M.E.C., Bishop Montgomery; Messrs. Curzon Allport and Alex. Morton from the Royal Society, and Mr. H. W. Knight, representing the Fisheries Board, waited upon the Premier (Sir Edward Braddon) and the Chief Secretary (Hon. W. Moore) relative to the granting of a close season for the fur seals in the islands of Bass' Straits.

Sir JAMES WILSON AGNEW, K.C.M.G., M.D., M.E.C., in introducing the deputation, said their object was to ask that something should be done for the preservation of the fur seals in Bass Straits. If sealing were allowed to be prosecuted unchecked for two or three years it was certain that the seals would be exterminated. Therefore, on the score of humanity alone, it was desirable that something should be done to preserve these interesting and valuable animals.

Bishop MONTGOMERY said he had discussed the question in Bass Straits with the actual sealers, and in no single instance did he find anybody who wished the sealing to be thrown open altogether. Although they did not want the sealing to be entirely closed, as it had been of late, they were unanimous that some restriction should be made so as to prevent the extermination of the animal. He pointed out that every factor which had led to the closing of the seal-fishery three years ago existed now, and that it was absolutely necessary that something should be done for their protection. He did not know the exact value of the seal in the market, but he knew that the half-castes, in whom he took a great interest, were anxious to make money from sealing, and if the industry were thrown open all the year round the traders would come in and sweep the rocks without any reserve, with the result that the industry would be completely destroyed. The sealers themselves had told him that it was perfectly heart-rending to hear the young seals crying for their mothers which had been killed, and the end of these young creatures was that they died of starvation. Therefore on the ground of humanity, and also on the ground of conserving an industry to benefit the half-castes, who were the only remnants of our aboriginal population, he impressed on the Government the necessity for proclaiming a close season for the seals.

Mr. CURZON ALLPORT regretted the enforced absence of Mr. Seal, the chairman of the Fisheries Board, who had the entire matter at his finger ends. The Fisheries Board had no personal interest in the sealing; it was comprised of a body of men who knew perhaps more than others about the subject, and they considered that if a close season were abolished, they might say good-bye to the seals in every portion of Tasmania. It was during the period that the young seal was with its mother that protection was necessary, because at that time the mother would not leave its young, and the consequence was that both mother and progeny were at the mercy of the merciless traders. Ten weeks had been suggested as the duration of the close season, but he thought it would be rather more than that. Tasmania should take to herself the credit and kudos of protecting such an important industry as the sealing. The Fisheries Board had given the matter their very fullest consideration, and he thought, with all due deference, that their opinions should receive a little more consideration at the hands of the Government, especially as the opinions and suggestions were for the welfare of the colony. He did not think there would be any difficulty in arranging with other Governments for the protection of these animals, for they would be only too ready to meet any reasonable recommendations with a view to such protec-

tion. The natives themselves were desirous of a close season being instituted, which was a strong point for the granting of the request. He believed that the existing police power in the islands would be quite enough to see that the law was carried out.

Mr. A. MORTON, to show how important the industry had been in the past, and might be made again in the future, said that a few years back as many as 36,000 seals were taken from Bass Straits in one season. But they were then killed indiscriminately, male and female and young, so that afterwards the animals became so scarce that the natives could not make a living at the industry. The Fisheries Board had recommended that the sealing should be closed for a period, and now fortunately the seals were again more numerous, but unless protection were still afforded they would soon be killed off again. New South Wales, Victoria, and New Zealand recognised the importance of a close season, and why Tasmania could not recognise the same he, as a member of the Fisheries Board, could not comprehend. The Board were not asking the Government to close the industry altogether for another three years, but simply for a short period each year that the females and young might be protected. In justice to the other colonies, Tasmania should institute a close season, for otherwise it led to a good deal of illegal sealing in other colonies. This had been particularly the case when New Zealand instituted a close time in Campbell Island, and Tasmania left Macquarie Island open. The present deputation, however, had no reference to Macquarie Island, but they did hope that the Government would allow to become law the resolution which had been unanimously passed by the Fisheries Board, and supported by the Royal Society, asking that a close time should be afforded seals.

Sir JAMES AGNEW pointed out that the protection asked for would entail scarcely any pecuniary expenditure whatever on the part of the Government.

Mr. H. W. KNIGHT said the reason of the deputation waiting upon the Government was in consequence of the notification by the Fisheries Board to the Royal Society that the proposed regulations formed by the Fisheries Board had been declined by the Government. The Royal Society and the Fisheries Board were both deeply interested in the matter, and the regulations had been prepared after very mature consideration and minute inquiries from those people who were engaged in the sealing, and whose interests would thereby be protected.

Sir EDWARD BRADDON, in reply, said he, of course, had to speak with some hesitancy on the matter, inasmuch as it was one upon which he would have to consult with his colleagues. But as far as his judgment guided him he agreed with the deputation, that in the interes's of humanity, and in the interests of the industry, which was a more or less important one, it was desirable that there should be a close season when the young seals were about. So much he might say, and, fortunately, his hon. colleague, the Chief Secretary, agreed with him. That expression of opinion would, he hoped, to some extent satisfy them, and he could only say that the matter would be immediately taken into consideration with a view to seeing what could be done to meet the request.

The deputation then withdrew.

DEPUTATIONS TO MINISTERS.

MOUNT WELLINGTON AS A METEOROLOGICAL AND ASTRONOMICAL STATION.

Sir JAMES AGNEW introduced several members of the Royal Society to the Chief Secretary (Hon. W. Moore) on Friday afternoon, April 19, 1895, and said it gave him pleasure to do so because he thought the object was a good one, being for the purpose of putting the colony's meteorological observations on a more useful, sound, and scientific basis. The deputation called to ask the Government to request permission from the Queensland Government for Mr. Wragge, a celebrated meteorological observer, to pay a visit to this colony. It was sought to establish a meteorological station on Mount Wellington, and Mr. Wragge was so well known in the other colonies that it was believed he could enlist their support in the matter. It was well known that these meteorological observations were useful to this and all other colonies. If South Australia, Victoria, Queensland, and New South Wales were to join in the movement the expense to each would be comparatively small. But all the Government was asked for now was to get permission for Mr. Wragge to come here, and frank him to come and go. There would be no other expense, because Mr. Kingsmill had asked Mr. Wragge to be his guest. If an observatory were established here under Mr. Wragge' directions they knew it would be well done, and in the right direction, probably eventually leading to an astronomical observatory being attached. It was known that Mr. Russell, of the Sydney Observatory, was anxious to get an observatory on Mount Wellington, where the atmospheric conditions were peculiarly favourable. It was the most southern point in Australasia, and was in many ways especially adapted for an observatory. This would be a great attraction to Hobart, and any little expense incurred would be more than recouped by the establishment of a meteorological and astronomical observatory up there.

The METEOROLOGICAL OBSERVER (Mr. Kingsmill) read extracts from a letter from Mr. Wragge showing that a meteorological station on Mount Wellington would be of great service. Mr. Wragge established a station on Ben Nevis, in Scotland, and another at Fort William, at the foot of Ben Nevis, where simultaneous readings were taken more than once a day, and these supplied important data. Naval officers stated that they had every confidence in Mr. Wragge's skill and forecasts. It was possible that something might be got from him in the way of making of some arrangements for sending his forecasts here by telegraph.

The GOVERNMENT STATISTICIAN (Mr. R. M. Johnston) said that the captain of H.M.S. Penguin had spoken strongly of the advantage it would be to have the proposed station on Mount Wellington. It would greatly aid the preparation of forecasts, and ensure their greater certainty. Captain Balfour assured him that in his own experience more than 70 per cent. of Mr. Wragge's forecasts were verified, and that with them he could go to sea with the greatest confidence. Anything that would improve such data and enable greater provision to be made for the safety of ships at sea was of national importance.

Mr. MORTON (secretary of the Royal Society) and Colonel LEGGE supported the request.

The CHIEF SECRETARY said it was a pleasure to say that the Government would extend every sympathy to such an object as the Royal Society were desirous of carrying out. There would be no difficulty

in the way of asking Mr. Wragge to come to Tasmania, nor in extending to him a free railway pass, but the Government was in no position to contribute to his expenses. A report from Mr. Wragge as to the establishment of a meteorological and astronomical observatory would be of great value to the Government and the Royal Society. When the scheme was fully complete, however, it would be quite soon enough to submit it to the Government.

THE DESTRUCTION OF BLACK SWANS.

The deputation, on leaving the Chief Secretary's office, went down to interview the Attorney-General (Hon. A. I. Clark) in reference to the wholesale destruction of black swans, and Sir JAMES AGNEW, in introducing them, said that their object was one which should have the sympathy of every member of the community. They wanted to protect from destruction one of the most interesting birds in Tasmania. The destruction of black swan was admittedly carried on in a barbarous manner about Swansea. At one time these birds existed in the colony in great numbers, but of late years their destruction had been carried on in a barbarous manner, for not only were they shot down in great numbers, but they were allowed to lie and rot, and their nests were robbed of the eggs. This was very destructive, because nothing was calculated to drive away birds from their haunts so much as robbing their nests, as no doubt the Attorney-General knew perfectly well. Perhaps the shooting of the birds was not so bad as robbing their nests. The only way to accomplish the object in view was to stop the destruction of the birds for one or two years at the outside. By that time the birds would be back again to their haunts, and people would be shown the evil of their ways, and a better state of public feeling would prevail.

Colonel LEGGE, as the Tasmanian member of the Australasian Committee for the Preservation of Native Fauna, said that since coming to Hobart he had taken the opportunity of writing to the Royal Society laying before the Council the information he had lately received at Swansea, and he could fully bear out everything said by Sir James Agnew. One of the greatest resorts of the black swan in Australasia was the Moulting Lagoon. At the beginning of the season people went there from 50 miles round to shoot, and there was great slaughter. Not half the birds shot could be taken away. The birds were driven some distance and then shot, being left to rot. It was stated that swans were not decreasing in the bay, but he found that they were becoming more scarce year by year in the outlying waters. If the birds were protected for two years, it would enable them to come back again. It was not only shooting the swans in such a wholesale manner, but there was the mischief of taking the eggs. The people who committed these depredations suffered a loss, because the swan was a really valuable article of food.

The ATTORNEY-GENERAL: The birds come under the present Game Act, don't they?

Colonel LEGGE: Oh, yes; and it is penal, as you know, to take the egg of a game bird.

The ATTORNEY-GENERAL: I suppose if the Game Act was stringently enforced it would be sufficient protection?

Colonel LEGGE: As regards the eggs; but we want the birds protected.

The COMMISSIONER OF POLICE (Mr. Shaw) protested against the use of the word barbarous in reference to anything done by Swansea people. He was assured by a resident that the swans were not shot and allowed to rot on the shore and in the water, but were all carried away, with, possibly, the exception of a tough old customer that even the Attorney-General might find hard to tackle. On the first day of the season as many as 400 swans were shot.

The ATTORNEY-GENERAL: How long does a swan keep after it is shot?

Colonel LEGGE: It all depends upon the weather.

Mr. SHAW: The birds were very numerous, and more flew away than were shot. At the same time he cordially agreed that protection for a couple of years would have a good effect. He heard that the eggs were taken, but it was a difficult thing to prevent, the eggs being, as a matter of course, deposited in out-of-the-way places. He had seen the remains of swans on the shore at Macquarie Harbour, and had shot them on the North-East Coast. Swans, he believed, were more numerous throughout the colony this year than formerly.

Colonel LEGGE repeated that numbers were shot and not taken away.

The ATTORNEY-GENERAL said that he would be very glad to introduce a short amendment to the Game Act this session in the direction indicated. It appeared to him that stealing the eggs was the greatest evil Mr. Shaw might instruct the police to be more vigilant than they had been.

Mr. SHAW said that people went on expeditions with boats to take the eggs.

The ATTORNEY-GENERAL thought that in such cases they might be caught.

Colonel LEGGE: People who buy and eat the eggs are as responsible as those who take and sell them.

Mr. CLARK: We should have to make it penal to have egg shells about the place. The only thing seemed to be to protect the birds for a year or two.

THE DEPORTATION OF THE NORFOLK ISLANDERS TO THE DERWENT IN 1808.

By James Backhouse Walker.

I.—The Settlement of Norfolk Island.

The laborious and valuable researches made in the English State Record Office by the veteran historian, Mr. James Bonwick, have a great interest for Australians, and mark a new departure for the historian of the Australian Colonies.

The Government of New South Wales has shown its sense of the value of the documents which Mr. Bonwick has discovered by printing them *in extenso*.* Our own Government, equally mindful of the importance of these records for the elucidation of our early history, has with a wise forethought availed itself of Mr. Bonwick's special knowledge to secure copies of the papers relating to the settlement and earliest history of Tasmania. Of this period no contemporary records have been preserved in our local archives; our knowledge of those early times has hitherto been derived merely from vague and inaccurate tradition. The material supplied by Mr. Bonwick, and placed at my disposal by the courtesy of the Government, has enabled me to lay before the Royal Society the first authentic story of the planting of Tasmania and of the motives which led to it.

In former papers which I have had the honour of reading before the Society we have seen how the occupation of our island came about. It was merely one episode of the long life-and-death struggle which England waged with France under the first Napoleon. It was due to the dread of possible injury to England from the sudden intrusion of a hostile French settlement in such close proximity to the young English colony at Port Jackson. The first puny occupation by Bowen at Risdon in September, 1803; the expedition of Collins to Port Phillip and its transfer to Hobart in February, 1804; the occupation of the Tamar by Paterson in August of the same year, and the consequent settlement of northern Tasmania, were all parts of the far-seeing and persistent policy by which the great English statesmen of that day did much to ensure the fall of Napoleon's power, and to give to England her world-wide dominion.

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*Up to this date (1895) five volumes have appeared, viz., Historical Records of New South Wales, 1762-1795 (3 vols.); History of New South Wales from the Records, 1783-1789 (2 vols.)

The next chapter in our colonial history to which I ask your attention, demands for our comprehension of its significance that we should leave these high questions of statesmanship, and turn our view for a time to a small and solitary island, separated from us by more than a thousand miles of ocean, the fortunes of which have, nevertheless, been strangely interwoven with those of our own colony.

Situated in seas where perpetual summer reigns, endowed with great natural beauty, rich in the fruits of the tropics, few spots in our modern world have had a history so strange, so various, so horrible, and yet so romantic, as that of Norfolk Island. At the present time it is the secure retreat of an easy and indolent race, who are yet the descendants of the actors in one of the most noted and picturesque piratical deeds recorded in English annals. It is, moreover, the peaceful headquarters of a Christian mission to the savage islands where the saintly Patteson laid down his life. It is most familiar to us as a synonym for cruelty and crime, a reminiscence of the days when the distant island formed a dependency and a part of the then penal settlement of Van Diemen's Land. To the majority this, which is within the memory of many still living amongst us, is the only known link between our colony and it—perhaps the only known fact respecting its earlier history. Comparatively few are aware that—with the single exception of Sydney—Norfolk Island is the oldest English colony in the South Seas. Perhaps still fewer know that to that same far-off island, so familiar to us in later days under another aspect, Tasmania was indebted for a large proportion of her earliest colonists. To this historical fact the familiar names of New Norfolk in the south, and Norfolk Plains in the north of this colony remain a perpetual but unappreciated memorial.

The history of Norfolk Island and its early colonists thus becomes an essential part of the history of Tasmania. The history of its colonisation and settlement can be gathered from scattered references in the works of Collins and other contemporary writers, but Mr. Bonwick's researches in the Record Office enable me to lay before the Royal Society the first authentic story of the evacuation of the island and the transference of all its free settlers to the Derwent in 1808.

And first as to its discovery. The first voyage of Captain Cook, lasting from 1768 to 1771, was that in which he did his most memorable work. The immediate object of the expedition was the observation of the Transit of Venus at Tahiti in the South Seas. But the voyage had more important results than astronomical observations, valuable as these were to science. In his little north-country collier of 370 tons, the *Endeavour*, Cook rediscovered and examined the islands of New Zealand, and then steering for the as yet unknown coast of New Holland,

anchored in Botany Bay (28th April, 1770), and examined the whole eastern coast, to which he gave the name of New South Wales. In two short years of this memorable voyage our great navigator had practically added the possessions of Australia and New Zealand to the English Crown, a work possibly only second in its importance in the world's history to the discovery of America.

Though Cook's first voyage was beyond question the most fruitful in results, yet the more leisurely explorations of his second voyage in the *Resolution* and the *Adventure*, extending from 1772 to 1775, are fuller of interest to the reader. Cook himself states the object of this second expedition to have been "to complete the discovery of the southern hemisphere." His first voyage had proved that if, as the geographers believed, any great southern continent did exist, it must lie far to the south of the latitude of New Holland. In three successive years during this second voyage Cook sailed to the far south, making three unsuccessful attempts to penetrate the frozen sea, and finally demonstrating that the dream of centuries had no foundation, and that there was no *Terra Australis Incognita* outside the limits of the circumpolar ice. In the intervals between his attempts on the Antarctic Ocean, Cook employed the winter months in making further explorations in the Pacific, and his journals contain most fascinating descriptions of this first view of the islands of the south and of their inhabitants in their original wild condition. In 1774 he employed his time in cruising among the Pacific Islands, beginning at Easter Island, with its gigantic stone figures, mysterious relics of a forgotten civilisation. Thence, after a stay at his beloved Tahiti, he worked westward among the islands to New Caledonia on his way to make his third and final attempt on the Antarctic Circle.

On the 10th October, 1774, as the *Resolution* was slowly ploughing her way from New Caledonia towards New Zealand, land was discovered bearing S.W. It was found to be an island of good height, five leagues in circumference. The island was bounded by rocky cliffs on nearly every side, with 18 to 20 fathoms water close to the shore. Cook says, "I named it Norfolk Isle, in honour of the noble family of Howard."

The boats were launched, and the weather being exceptionally favourable, the captain landed without difficulty behind some large rocks on the north-east side, near what was afterwards known as the Cascades. Along the shore was a belt of thick scrub, and beyond this a dense forest of a sort of spruce pine, the trees as thick as two men could fathom, and exceedingly straight and tall. The soil was rich and deep, and the Captain found many trees and plants common to New Zealand, particularly the flax-plant, growing near the sea most

luxuriantly, and much finer than he had seen it in New Zealand. The woods abounded with pigeons, parrots, parrakeets, hawks, and many New Zealand birds. The island was uninhabited. The party from the *Resolution* may have been the first human beings to tread its tangled forests, though it is possible that at isolated periods previously Maori canoes had been driven by heavy south-east storms from the coast of New Zealand, and that shipwrecked Maoris had maintained an existence on the island for years; for in the early days of the settlement two canoes were found on the beaches, and it is said stone adzes resembling those in use in New Zealand were turned up when the land was being broken up for cultivation. Cook gave but a few hours to the examination of the island, and on the following day sailed away for New Zealand. On the publication of his book, his description, brief as it was, of the capabilities of Norfolk Island, of its rich soil, its dense pine forests, and profuse growth of New Zealand flax, attracted attention to it as a desirable possession. Consequently, when the Government in the year 1787 resolved on establishing a penal settlement at Botany Bay, it was determined to occupy this promising island as a dependency of the principal colony. In the Royal instructions to Governor Phillip the following passage occurs :—"Norfolk Island . . . . being represented as a spot which may hereafter become useful, you are, as soon as circumstances admit of it, to send a small establishment thither to secure the same to us, and prevent it being occupied by the subjects of any other European power." The instructions also contain directions to the Governor as to the cultivation of the flax-plant, and its use in manufacturing clothing for the convicts and also for maritime purposes.

Little more than a week after Governor Phillip had landed on the site of Sydney (6th February, 1788), Philip Gidley King, then a young lieutenant on board H.M.S. *Sirius*, received his commission as Superintendent and Commandant of the settlement of Norfolk Island, with orders to take a small party of people and some live stock to this distant isle, which was intended to serve as a place of seclusion for troublesome characters, and as a possible succour for the main settlement in case of famine. The party placed under King's charge was very similar to that which 15 years later he himself despatched under Lieut. Bowen to occupy Risdon on the Derwent. It consisted of an officer and surgeon from H.M.S. *Sirius*, four seamen and two marines from the same vessel, with nine male and six female convicts. They sailed from Port Jackson in the armed tender *Supply*, and were 14 days before, on 29th February, they came in sight of their destination. For days they cruised round the island searching in vain for a harbour or even a landing-place, sometimes in the ship, sometimes

exploring the shores in a boat, but everywhere baffled by the inaccessible cliffs or the thundering surf of the ocean swell on the rocky beaches. At last, after five days' search, and when they had almost despaired of success, they found a beach in a bay on the south side of the island, protected by a long reef extending parallel with the shore and about 150 yards distant from it. At the end of the reef was an opening, little more than sufficient to allow two boats to pass each other, which gave access to the smooth water inside. Here King got his little party landed with their stores, and soon had a small patch of ground cleared and tents pitched. Having settled his colony, King now proceeded to explore his new domain. He describes the island as six miles long and four broad, and estimated it to contain about 11,000 acres. The ground was everywhere covered with an almost impervious forest, through which he forced his way with great difficulty. The principal tree was the pine, which grew everywhere. These great trees were often 140 to 200 feet high, 30 feet round at the base, and 80 feet to the first branch. The roots sometimes ran two feet above the ground twisted in all directions. In this forest grew a sort of supplejack as thick as a man's leg, hanging in festoons from tree to tree, and forming a network which was well nigh impenetrable. From the highest point of the island, 1200 feet above the sea-level, which he named Mount Pitt, he had a view of a continuous forest without a break, for in its natural state there was not a yard square of clear ground on the whole island. The soil was deep and rich, but not a blade of grass grew anywhere. Pigeons and parrots were in great numbers; the pigeons so tame that they could be knocked over with a stick. These explorations were made with great difficulty, and the explorers often returned with their clothes torn to shreds. To conquer the virgin forest King had only 12 men, and one of these was an old man of 72, another a boy of 15. Small as the company was it was a difficult one to manage. Before a month passed the boy, having been caught stealing rum, was punished with 100 lashes, which King in his diary remarks he hoped would have a good effect; and later on we hear of a woman being punished in a similar way. To add to the Commandant's troubles all his people were ill with scurvy from their salt diet, and his first attention was given to obtaining fresh provisions. At first they got turtle, but these were soon scared away. The fish supply was precarious, as fishing was only possible in calm weather. Their chief resource was the pigeons, and the birds which abounded on Mount Pitt gave them many a good meal. A few banana trees were found growing not far from the settlement, but for vegetables they were chiefly dependent on nikau-palm, the crown of which furnished a good vegetable not unlike a cabbage.

Under these circumstances the progress of the settlement was very slow, but gradually, as the little colony was reinforced by fresh drafts from Sydney, ground was cleared and brought under cultivation, huts and store-houses were erected, and a weatherboard cottage, 24 feet by 12 feet, was built for a Government house. In January, 1790, two years after his first landing, there were on the island 79 male and 33 female convicts and 32 free settlers; in all 144 souls. King's administration of Norfolk Island lasted (with one interval) from February, 1788, to September, 1796, a period of eight and a half years. He has left a diary of those days extending over many quarto pages of print. It is dreary reading, being a chronicle of petty crimes and rough punishments, of crops destroyed by blight or grub, of disorders, conspiracies, and mutinies among the prisoners, of discontent among the settlers whether free or emancipated. King ruled this turbulent community like a sailor, with a mixture of rough severity and good-natured lenity, dealing out barbaric punishment to offenders, and eqally barbaric indulgences as a reward for improved behaviour.

The early attempts at agriculture were not very successful. When his first little patch of wheat came up the south-west wind blighted it and turned it black; the next crop (and many a one after that) was nipped off by a small black caterpillar which came in thousands; others were destroyed by a great worm; much was eaten by parrakeets; and even when the wheat was harvested it was attacked by the weevil and rendered useless. The rats—the only animals on the island—ate his Indian corn, in spite of traps and pounded glass mixed with oatmeal which slew them in hundreds. The most successful crops were potatoes and vegetables. Nor was he more successful with his live stock than with his agriculture. There being no grass on the island the stock had to be fed on herbs and plants. The sheep succumbed and died, partly from starvation, partly from scab. The pigs suffered greatly from poisonous herbs, and he had great difficulty in feeding them until he found that a tall palm or fern, growing 80 feet high, had a soft core tasting like a bad turnip, on which the hogs throve splendidly.

In spite of all these misfortunes, however, and in spite of the calamity of a hurricane of wind and rain from the south-east which laid waste and nearly destroyed the camp and the plantations, the little settlement struggled ahead.

In January, 1790, the Commandant records with pride that he had 30 acres of land in cultivation and his free settlers 18 acres. He had in store 300 bushels of wheat and 140 bushels of Indian corn.

While King was thus rejoicing in the progress of his little colony, he little thought of the troubles which were impending,

and which were destined to make the year 1790 a sad and memorable year for the Norfolk Islanders.

To understand the position of affairs we must turn for a moment to the principal settlement at Port Jackson. The two years' supply of provisions which the First Fleet had brought out was now nearly exhausted, and every one at Port Jackson was in daily and anxious expectation of the arrival of ships from England with a fresh supply. In February only four months' provisions, calculated at half allowance, remained in store. It was impossible to say when relief might arrive, and the prospect of starvation began to stare them in the face.

In this emergency Governor Phillip resolved to divide the settlement, and send a large body of convicts and soldiers to Norfolk Island. The Commandant had constantly written in such high terms of the rich soil of the island that it seemed a garden of fertility in comparison with New South Wales, and the Governor thought it would easily support a larger population, and thus relieve the distress of those left in the principal colony. Accordingly, Captain Hunter was ordered to prepare H.M.S. *Sirius* for sea, and embark 186 convicts and a company of marines, while the armed tender *Supply* was to accompany her with 20 convicts and another company of marines. This would make an almost equal division of the people between the island and the main settlement at Port Jackson. Major Ross, the Lieut.-Governor, was to be placed in command of the dependency in place of Lieut. King, who had obtained leave to visit England. A proper proportion of the remaining provisions and stores were put on board, and the ships sailed for Norfolk Island on the 6th March, 1790. A week's sail brought them to the island, and not being able to land in Sydney Bay on account of the surf, they ran round to Cascade Bay on the north side, and in two days contrived to land the people, 270 in all. Before they could land the stores a storm came on and the ships were driven out of sight of land. It was four days before the *Sirius* could make the island again. The *Supply* was already in Sydney Bay, and the signal was flying that the landing was safe. Captain Hunter therefore stood in, loaded the boats with provisions and sent them in to the landing-place within the reef. Meanwhile, as the *Sirius* was settling fast to leeward, Hunter made sail to get her out of the bay, but could not weather the rocks off Point Ross on the western side. The ship twice missed stays and then slowly drifted stern first towards the reef opposite the settlement, and struck. The masts were instantly cut away so that she might lift on to the reef, as she was in danger of going to pieces from the force of the seas that struck her. This was 11 A.M. All the provisions that could be reached were immediately got on deck and secured. This accomplished, a line was floated over the

reef with an empty cask, and a hawser hauled on shore and made fast to a tree. At 5 o'clock the surgeon's mate was hauled ashore through the surf on a traveller fastened to the hawser, and by dark Captain Hunter and most of the seamen were landed, having been dragged through a heavy surf, many being much bruised. The captain was so exhausted that he was nearly drowned. The rest of the crew got ashore next day.

The situation of the settlement was extremely critical. There were now on the island 506 souls on half allowance of provisions, which would last a very short time unless the stores could be saved from the *Sirius*. Lieut.-Governor Ross therefore assembled the officers, and it was resolved that, as under the ordinary law there was no power to punish serious offences on the spot, it was absolutely necessary for the general safety to establish martial law. Further, that all provisions, public and private, should be thrown into a common stock in the storehouse, and put under the charge of three persons, viz., Captain Hunter, a person appointed by the Governor, and a third person to be named by the convicts. On the fifth day after the wreck, and before any of the provisions had been saved from the *Sirius*, the *Supply* sailed for Sydney, with Lieut. King and part of the crew of the *Sirius*, to carry the disastrous news to Port Jackson, where it created fresh consternation and deepened the prevailing gloom; the more so from the impossibility of sending relief to the unfortunate Norfolk Islanders.

Fortunately, after the *Supply* left they were able to get out of the wreck a large part of the provisions, though much was lost or spoiled. For some weeks Lieut.-Governor Ross, Captain Hunter, and the people shut up in the lonely isle entertained a glimmering hope that they might see the *Supply* return with the comfortable news of arrivals from England. Long and anxiously they scanned the sea, and when hope failed and they had come to the reluctant conclusion that Governor Phillip could not relieve them, but had been obliged to send Lieut. Ball on more pressing service, their situation began to wear a very alarming aspect.

The weekly allowance of food was now still further reduced, and Captain Hunter records in his journal his apprehension that before long many of the convicts, who often ate at one meal the whole week's allowance, would be dead from starvation, or executed for depredations. This gloomy anticipation would doubtless have been realised but for an unexpected resource which was discovered.

In the month of April the people who were searching the island for food found that Mount Pitt was crowded with birds. These sea-birds were away all day in search of food, but as soon as dark came on they hovered in vast flocks over the

breeding-ground, which was hollowed by innumerable burrows. The seamen, marines, and convicts went out to Mount Pitt every evening, arriving soon after dark. They lighted small fires to attract the birds, which alighted faster than the people could knock them down. After killing 2000 to 3000 birds every night there was no sensible diminution in their numbers at the end of May. The people called the bird "Pittites;" Phillip in his voyage gives it the name of the Norfolk Island Petrel. It is known to us in Tasmania as the Mutton Bird.

Captain Hunter in his journal calls it the *Bird of Providence*. Such it undoubtedly was to the Norfolk Islanders, who, but for its timely and wholly unexpected arrival, must have perished in numbers from starvation. It is true that the sea abounded in fish, and the neighbouring islets (Phillip Island and Nepean Island) swarmed with countless multitudes of sea fowl, but they were unattainable. For a month together the surf ran so high that not more than once or twice during that time was it possible to launch a boat, and even then the fishing was often unsuccessful, while the islands that the sea-birds frequented were usually inaccessible on account of the tremendous surf.

Towards the end of July the birds on Mount Pitt began to get scarce. As only 10 or 12 days' salt provisions at short allowance were now left, the Lieut.-Governor reduced the ration to three lbs. flour or maize meal and one pint of rice per week. The people were so reduced by want of food that hardly any work could be done, and it was with great difficulty that the little crops could be got in.

On the 4th August, while in this deplorable state, with famine staring them in the face, one of the sailors came running into the settlement, crying out—"A ship! a ship!" Men, women, and children rushed out to welcome her, and Captain Hunter and many of the people hurried across to the north of the island to communicate with her; but when they arrived in sight of her, in spite of their signals, she stood off before the wind and sailed away. Hunter, in his journal published some years later, speaks of their bitter disappointment and indignation at the want of humanity in the captain who, although he might have nothing for them, might at least have informed them of the near approach of relief.

From the appearance of the ship the people were convinced that relief was not far distant, and three days later two ships hove in sight. They proved to be the *Justinian* and *Surprise*, from Port Jackson, with provisions and 200 convicts. The mystery of the non-arrival of supplies from England was now cleared up. The *Guardian*, Captain Riou, had sailed from Plymouth for Sydney with provisions in August, 1789, but she had been wrecked at the Cape, and it was not until the arrival

at Port Jackson of the Second Fleet in June, 1790, that the people felt the danger of starvation to be past.

The relief at last sent to the islanders had with unacccountable want of consideration been delayed two months after the arrival of the fleet, and it arrived only just in time. The mutton birds had deserted the island, the fish also had failed them entirely, and a delay of another six weeks would have meant death by starvation for the greater part of the inhabitants.

Captain Hunter did not get away from the island, which was associated with so much suffering and anxiety to him, until February, 1791. He considered its capabilities much overrated, for—while he admits the richness of the soil—the crops were liable to destruction by blight, grub, caterpillar, and other plagues. The timber of which so much had been expected was very inferior. Instead of being able to support 2000 people as Governor Phillip expected, he thought 500 too many, and these should be such as had forfeited all hope of seeing their native country again, and would know that their existence depended on their industry. He recommended the Government to remove the establishment to Port Dalrymple, as its only use could be to supply South Sea whalers with fresh meat and vegetables; though he admitted that as a place for incorrigible criminals the colony had this advantage—that escape was impossible. Of the island he says, "It is a dreadful place, almost inaccessible with any wind."

Notwithstanding the unfavourable opinion of Captain Hunter and others, Governor Phillip continued to send fresh batches of convicts and small settlers, and when Lieut.-Governor Ross gave up the command to King, on the return of the latter from England in September, 1791, the population had increased to over 800 souls.

King had now the rank of Lieut.-Governor of Norfolk Island. He had founded the colony, and took the most sanguine view of its capabilities, and of the practicability of making it prosperous and self-supporting. Besides getting a large area of land under cultivation by the labour of the prisoners, he encouraged these whose time had expired to take up small allotments for growing vegetables and grain. A number of soldiers and sailors were also induced by the offer of grants of land up to 60 acres to become agricultural settlers.

The greatest obstacle to the progress of the settlement lay in the character of the people. King says of the prisoners that while some were well behaved the bulk of them were miserable wretches. Collins, in his account of New South Wales, gives a deplorable picture of the disorder and crime which were rampant at Port Jackson, and as the selection for Norfolk Island consisted of the worst and the doubly-convicted, the condition of affairs in the island was not likely to be better

than in Sydney. The settlers were mostly soldiers and sailors and others who had little or no knowledge of agriculture, and were full of grievances and complaints. Still the colony increased in population and production. At the end of 1793 there were 1008 souls on the island. The settlers had become a considerable body, and they had command of a plentiful supply of labour in the expiree prisoners who had hired themselves out to farm-work. The Government took into store all grain grown by the settlers at a fixed price per bushel. This so stimulated production that in the year ending May, 1794, there were grown 34,000 bushels of maize and wheat. The settlers were all prosperous, and the Lieut.-Governor was able to offer to send, if required, 20,000 bushels to Sydney for commissariat use. The supply was now so large that the Governor was obliged to refuse to purchase grain which he could make no use of, and the settlers found themselves without a market. Many gave up their farms; many left the island; others turned their attention to raising hogs, which had multiplied exceedingly. In 1795 King could offer the Sydney commissariat 40 tons of cured pork which had been salted on the island.

It will be remembered that the New Zealand flax plant was most plentiful at Norfolk Island. Lieut.-Governor King was very anxious to develop the manufacture of the fibre into cordage and canvas. Many attempts were made but with small success, as no proper method of dressing the fibre could be discovered. King's method of grappling with this difficulty is sufficiently characteristic of the times. He offered to Captain Bunker, of the whaler *William and Ann*, £100 to kidnap two natives of New Zealand and bring them to Norfolk Island as instructors in the art of flax-dressing. Captain Bunker did not succeed in earning the money. King seems to have made his views known to the Admiralty, for when the *Dædalus* storeship was employed to carry provisions to the Sandwich Islands for Vancouver's discovery ships, Lieut. Hanson who commanded her was directed to touch at New Zealand on his way back to Sydney and try to supply King's wants. The *Dædalus* accordingly touched at New Zealand, about Doubtless Bay, and Lieut. Hanson having enticed on board his ship two Maoris, named Tuki and Uru, at once made sail and carried them away to Governor King. The Maoris, who had been frantic with grief when they found themselves entrapped, were very sullen on their arrival at Norfolk Island, and absolutely refused any information respecting the flax. King says: "The apprehension of being obliged to work at it was afterwards found to have been a principal reason for their not complying so readily as was expected. By kind treatment, however, and indulgence in

their own inclinations, they soon began to be more sociable. They were then given to understand the situation and short distance of New Zealand from Norfolk Island, and were assured that as soon as they had taught our women to work the flax they should be sent home again. On this promise they readily consented to give all the information they possessed, and which turned out to be very little. This operation was found to be among them the peculiar province of the women; and as Uru was a warrior and Tuki a priest, they gave the Governor to understand that the dressing of flax never made any part of their studies." Whatever may be thought of the means King employed to obtain the services of Uru and Tuki, it must be acknowledged that he fulfilled his promises to them very handsomely. He decided to accompany them to New Zealand, and embarked with them and a guard of soldiers on board the *Britannia* to take them back to their homes. This was safely accomplished, and the Governor and his Maori friends parted with great expressions of mutual regard.

The instruction given by Tuki and Uru, meagre as it was, was sufficient to enable a few hands with very primitive appliances to manufacture 30 yards of coarse canvas in a week, and the Lieut.-Governor stuck pluckily to his manufactory, maintaining to the last that it was a valuable industry, and could easily give employment to 500 hands.

On the 25th October, 1796, Lieut.-Governor King gave up the government, which he had held, with a short interval, for nearly nine years, and proceeded by the *Britannia* to England. Shortly afterwards he received the appointment of Governor of New South Wales; in which capacity, in 1803, he despatched Lieutenant Bowen to establish the first settlement in Tasmania.

On leaving Norfolk Island he wrote an account of the condition of the settlement, which is printed in Collins' "New South Wales"; the population was 887, and of these only 198 were convicts. He says that 1528 acres had been cleared. Besides huts and cottages a Government-house, storehouses, and military barracks had been built. A water-mill had been erected at the Cascades, and this and two windmills ground the corn which each man had formerly to grind for himself. There were two schools on the island.

Of the fertility of the land he spoke highly; the principal products were maize, wheat, potatoes, and vegetables. The yield of wheat averaged 18 bushels per acre. Maize gave two crops a year, averaging 45 bushels per acre, and often reaching as much as 70 to 80 bushels. He calculated that if the whole of the arable land was put under cultivation it would produce 225,000 bushels of grain, or even 450,000 if fully cultivated. There was little live stock, a few cattle and sheep, a number of goats, and fully 5000 swine. The swine might be a great source

of revenue; up to that time 500,000 lbs. of pork had been used or exported.

With King's departure the settlement began to retrograde; but the story of its gradual decline and the final deportation of its settlers to Tasmania must be left to be dealt with in a future paper.

II.—The Deportation to the Derwent.

In the last paper which I read before the Society I sketched the strange story of the first planting of a European colony in an island of the South Sea,—the settlement of Norfolk Island by Lieut. King in the year 1788, and its fortunes during a period of eight years. I now propose to trace the history of its failure and abandonment, and the transfer of its settlers to our own island.

From his first landing in February, 1788, Lieut. King had formed the most sanguine expectations of the future. He was charmed with the beauty of the island. With such a genial climate and such a fertile soil it should grow into one of the most flourishing and valuable of colonies. From this view he never wavered. To secure this result he struggled bravely and pertinaciously to overcome the difficulties of nature and the perversity of man. Nature met him on the threshold with a well nigh inaccessible coast and a dense and tangled forest, and fought him with hurricanes and blighting winds, with drought and caterpillars, which marred his labour. But to rule and organise the unpromising human material with which he had to work, and to turn it to account in the face of laziness and disaffection, was a more trying task than to conquer nature. Still, during those eight or nine years he had fought his way through difficulty and not a few disasters to the attainment of a very fair success. When in September, 1796, he resigned his government, he left with the feeling that the settlement to which he had given some of the best years of his life had overcome its first difficulties, and was firmly established with a bright outlook for the future. The little island had a population of nearly 900 people, who dotted its surface with clearings and cottages. More than a third of its area (5247 acres) was occupied, and 1528 acres cleared and cultivated. The production of grain and pork not only sufficed for the wants of the inhabitants, but left a large surplus for exportation to New South Wales. And yet the resources of the island were, in his view, only beginning to be developed. Instead of a population of 1000, he considered it could easily support more than twice that number, and could more than quadruple its products. By ordinary methods it would be easy to produce a quarter of a million of bushels of grain; careful husbandry might even double that quantity. In King's opinion it might become a

paradise for small landholders, who would be enriched by the labour of those convicts whom it was desirable to isolate from the main settlement. The settlers would consist of soldiers, sailors, and the better class of expiree prisoners, while forced labour would clear and cultivate their lands and build their houses. New South Wales would benefit by the removal of the worst and the most turbulent, and these would be easily controlled in an isolated dependency by a small military force, and under strict discipline would be transformed into a means of wealth to the community instead of being a menace to its order. The mistake of the New South Wales settlement had been that it had been formed exclusively of convicts, but in Norfolk Island the true solution of the transportation question would be found. It would be a community of free settlers, to which the convicts would supply labour. It would be not only a self-supporting but a profitable penal colony.

When Captain King left Norfolk Island for England in the *Britannia* in 1796, he handed over the command to the principal military officer, Captain Townson, of the New South Wales Corps. Now that the island produced grain and meat enough to feed its inhabitants, its most pressing want was a vessel expressly appropriated to its service, and always ready for communication with Sydney. Vessels were so few at Port Jackson that none could be spared for the exclusive use of Norfolk Island. Captain Townson therefore determined to try what the island could do for itself. The indigenous pine provided timber in plenty, but appliances were few, and the want of a harbour presented almost insuperable obstacles to ship-building. However, after some months' labour, there stood upon the beach before the settlement a little craft of 25 tons, built of Norfolk Island pine, completely rigged and equipped for sea. An ingenious man on the island made a quadrant with which to navigate her. She was launched from the shore, and had to go on her voyage to Sydney without any further preparation. Probably she was strained in launching, for she proved to be very leaky. With the aid of two pumps, however, the little crew managed to keep the water under, and she safely reached Port Jackson (15 June, 1798) with the Commandant's despatches to Governor Hunter. This vessel, the first and the only one built at Norfolk Island, was named the *Norfolk*, and though little more than a decked longboat, she was destined to do good service and attain a certain celebrity. Captain Townson and the Norfolk Islanders were not allowed to benefit by the vessel which they had built with so much difficulty. When she reached Port Jackson Flinders and Bass were burning with anxiety to solve once for all the vexed problem of Bass Strait and the insularity of Van Diemen's Land. They persuaded Governor Hunter to fit

up the *Norfolk* for a voyage of discovery, and four months after her arrival at Sydney she sailed with those two adventurous explorers, passed through Bass Strait, and accomplished the first circumnavigation of Van Diemen's Land.

In April, 1800, Captain King returned to New South Wales from England, but he did not go back to his old government at Norfolk Island. He had brought with him His Majesty's Commission as Lieutenant-Governor of New South Wales, and when Governor Hunter left Sydney for England in September, 1800, King succeeded him in the government of the principal Colony.

Before Governor Hunter's departure, and in accordance with orders from Home, Major Joseph Foveaux, of the New South Wales Corps, was appointed Commandant of Norfolk Island, and assumed the Government in July, 1800. Matters were in a bad way in the island. With the withdrawal of King's zeal and energy improvement had ceased. The population had increased somewhat, but in all other respects the settlement was steadily going back. Governor Hunter, who touched at the island on his way to England in H.M.S. *Buffalo* (October, 1800) to land some mutinous Irish prisoners, gave a deplorable account of its condition. Its appearance was most unpromising. All the buildings were in a state of rapid decay, and but few signs of industry were visible. The people were idle and refractory, the crops were mostly a failure. All they could supply to the *Buffalo* was a few hogs and some vegetables.

The sanguine hopes of King were doomed to disappointment. The island had been at first occupied chiefly with a view to developing the manufacture of New Zealand flax. This had proved a complete failure. Much had been expected from the pine forests ; but the timber was found to be unfit for ship-building and too brittle for spars, even if it had been possible for ships to lie there and take it in. The soil was fertile, it is true, but from the uncertainty of the climate and the many plagues—drought, blight, and caterpillars—the crops oftener than not yielded but a poor return. The project of settling pensioners and expirees had proved abortive. The soldiers and sailors were mostly too ignorant of farming to succeed, and the inveterate idleness of the bulk of the settlers of another class had been a still more insuperable obstacle to their prosperity. Moreover, they were discontented and disaffected, and laid the blame of all their misfortunes upon the Government.

Governor Hunter was not alone in his opinion. Collins, who had ample opportunities of forming a correct judgment, speaks in his work on New South Wales of Norfolk Island as the place for transporting offenders who had been again

convicted in New South Wales, and that this was more dreaded than the first transportation. He thought that for this purpose it might be continued as an alternative for the gallows, but as a settlement the expense was quite disproportionate to any advantage to be derived from it. From the reports of Flinders and Bass on the climate, soil, and harbours of Van Diemen's Land, he thought that territory would be found much more profitable than this parched and inaccessible island.

Such was the condition of affairs when Major Foveaux took over the command in July, 1800. Foveaux was not the man to cope with the situation, or to infuse a spirit of order into a disorganised society. As if with the intention of making his task more difficult Governor King added a new trouble by banishing to the island a number of the most turbulent of the Irishmen who had been exiled to New South Wales for their participation in the rising of 1798: they had given much trouble at Port Jackson through their mutinous conduct, and it was thought that by banishing the most turbulent to the distant settlement they could be kept under better restraint. But in Norfolk Island society was even more anarchical than in the principal colony, and there was abundant opportunity for plotting. In December, 1800, a conspiracy was discovered among the Irish, the object being to overpower the officers, seize the island, and escape. As the Irish numbered only 36 men, while there was a force of 100 soldiers and 26 constables, the plot could scarcely have been called formidable. But, if Foveaux was unable to preserve order, he could at least take summary and barbarous vengeance. He received full information of the plot on a Saturday evening. On the Sunday morning the people went to church as usual. When service was over all the Irish were ironed and put into gaol. At two o'clock the Commandant had a gallows erected, and two of the ringleaders, John Whollahan and Peter M'Lean, were brought out and forthwith hanged without trial or examination.

In the memoirs of the so-called General Holt we have some graphic sketches of the state of Norfolk Island under Major Foveaux's government in 1804. Joseph Holt was a prominent leader of the United Irishmen during the rising of 1798, and was transported—or to speak more correctly, exiled—to New South Wales as a political prisoner. As a State prisoner Holt was allowed full liberty in the Colony, and being a man of ability and energy attained a fairly comfortable position. At the time of the Castle Hill rising in 1804, however, he came under suspicion, more on account of his antecedents as a rebel leader than from any actual proof of his complicity in the plot. Governor King, however, made up his mind that Holt was a dangerous character, and banished him to Norfolk

Island. There is no doubt that Holt's picture is strongly coloured by his prejudices, and must be taken with large allowances, but the account he gives of the arbitrary cruelty which reigned under Foveaux is too surely corroborated from other sources to be very far from the truth. As a political exile Holt was legally a free man in New South Wales, though subject to certain restrictions. He had not been convicted of any crime when exiled to Norfolk Island, yet immediately on arrival he was clapped into gaol, and by Foveaux's orders was illegally put into the working gang as a convict. At first he refused to work, but, mindful of the absolute power of the Commandant, who was sole judge and jury, he finally submitted. For some three or four months he was kept in the gang, in which the men were subjected to most brutal treatment from the overseers. At length, under the combined effect of severe labour and exposure and insufficient rations Holt broke down, and in consequence of strong representations from Surgeon D'Arcy Wentworth to Foveaux of the illegality of this treatment, he was exempted from further labour and given his liberty. He remained on the island for 15 months longer, until Major Foveaux was succeeded in the command by Captain Piper. Holt describes Norfolk Island in these terms: "The dwelling of devils in human shape, the refuse of Botany Bay, the doubly damned."

In spite of Governor King's partiality for the settlement he had founded, it was becoming evident to the Home Authorities that Norfolk Island was never likely to become a successful Colony, and that it would always continue to be an expensive burden on the Government. Dr. Lang, in his "History of New South Wales," roundly charges King with having, from some interested motive, done his best to discredit the settlement at the Colonial Office. In the absence of any direct proof, and from the general tenor of King's conduct with regard to the changes in the establishment, this charge seems to be wholly without foundation. It is much more probable that the views of such men as Hunter and Collins, with the unsatisfactory reports of the condition of the settlement, and its great expense, prompted the Home Government to decide to reduce the establishment, if not to abandon the island altogether.

At the same time, Governor King's urgent representations of the danger which was impending over the new Colonies from the designs of the French had roused the English Government to take active measures to forestall them. In December, 1802, the Cabinet had decided to form a settlement at Port Phillip, and in the following April Colonel Collins' expedition had been despatched for that purpose.

Still the Government was uneasy; and in June, 1803, Lord Hobart wrote to Governor King that the position of Port

Dairymple in Bass Strait rendered it particularly necessary, from a political point of view, that an establishment should be placed there, and directed him for that purpose to remove from Norfolk Island a portion of the settlers and the convicts, and send them to Port Dalrymple under the command of Lieut.-Col. Paterson, at the same time recalling Major Foveaux to Sydney. Lord Hobart's despatch did not arrive at Port Jackson until May, 1804, nearly 12 months after it was written. Collins having in the meantime abandoned Port Phillip for the Derwent, the importance of occupying a station in Bass Straits became more urgent, and King at once applied himself to carry out his instructions respecting the settlement of Port Dalrymple, which was eventually accomplished by Paterson settling at George Town in November, 1804.

King did not show the same alacrity in complying with the instructions respecting Norfolk Island. There is little doubt that they were distasteful to him. He contented himself with writing to Foveaux (23 June, 1804) that the establishment was to be reduced, and that towards the end of the year he would send a vessel or vessels to remove any settlers who were inclined to go to the new colony at Port Dalrymple. At the same time he said that he did not wish to force removal on any settlers who were valuable and industrious, and who might be ruined by having to give up their land after the expenditure of so much labour and the endurance of so much hardship. Nor, on the other hand, did he want the useless and idle, who might be only too willing to move. Still, out of the 33 larger landholders there might be some who would be willing to go, and they should be encouraged by the offer of liberal terms. They and their stock would be removed at the public expense, and what was necessarily left behind would be taken by the Government at a valuation. On surrendering their grants they were to have four acres for every acre cultivated at Norfolk Island, and two acres for every acre of waste land. They were to have rations for twelve months for themselves and their households, and be allowed the labour of two convicts for the same period. Of the 180 little occupiers there might be a few who were worthy of encouragement and removal.

On receipt of the Governor's instructions Foveaux assembled the settlers (19th July, 1804), and laid the proposal before them. It was well received, and some 40 at once gave in their names as ready to try their fortunes in Van Diemen's Land. These 40 were free settlers, most of them being mea who had been either in the army or the navy. A considerable proportion held grants of from 30 to 120 acres each. A few had flocks of sheep ; one, George Guest, as many as 600. Amongst those who were strongly recommended by Foveaux as the most industrious and fittest for selection we find the names of

Daniel Stanfield, Abraham Hand, John and Joseph Beresford, George Guest, Wm. Pentony, Joseph Bullock, Edward Fisher, James Morrisby, and James Belbin. The only stipulation they made was that they should be allowed to wait until their crops were ripe, so as to take with them their corn and maize, and not be wholly dependent on rations from the public stores.

But the settlers soon repented of their hasty decision. When the *Integrity* arrived from Sydney a fortnight later (4th August) with further despatches from the Governor, and their contents were communicated to two of the principal inhabitants, out of the 41 who had sent in their names all but 10 withdrew. As the settlers would not move voluntarily, and as King had no instructions to use compulsory measures, the only thing left to do was to reduce the establishment. Foveaux was of opinion that such half measures were a mistake, and that the choice lay between continuing the colony on its existing footing or abandoning it altogether. To cut down salaries and discharge officers would work great injustice to men who had spent considerable sums in building houses and making improvements. They must be compensated, and the saving effected would be minute. But, indeed, any material reduction would be impossible. Courts of justice must be kept up, and there must be a sufficient number of officers to make a jury. Governor King proposed sending a vessel annually with officers to make a court, the vessel to bring back salt pork for the supply of Port Jackson. But a court once a year was quite insufficient, and their experience of salting pork was not encouraging. The pork was often so badly cured that it was useless for food, and the supply of swine could not be depended on. Corn was absolutely necessary both for their rearing and fattening, and the frequent scarcity of corn caused great mortality. Indeed, the expectations formed of the island were never likely to be realised. In 1801 there had been a famine owing to the scarcity of grain and pork, and the inhabitants had been dependent for food on fish. In 1802 the crops were better, but since then they had either failed generally, or had been so poor as hardly to reward the settlers' labour. But for the large yield from Government land in 1802, large supplies would have been required from Port Jackson. As it was, they had been obliged to get flour from Sydney, and even then could only allow a reduced ration. Many of the settlers were in great distress, and if the crops failed again—as indeed was afterwards the case—they would be in absolute want.

Yet in spite of all these disadvantages many of the settlers, especially those who had come over with the first settlement, showed a great reluctance to move. They were attached to their homes, and did not care again to face the difficulties and

privations which they would have to encounter in a new settlement before they could get round them even such comforts for their families as they had at Norfolk Island. If they knew that the Government meant to abandon the settlement altogether, probably they would be willing to remove. One of the greatest obstacles was their debts. But perhaps the offer of greater inducements might overcome their reluctance, and eventually they would all benefit by the change.

Governor King had no authority to abandon the settlement, and was probably only too pleased that the settlers whom he had planted showed such an attachment to his favourite island, or at least so much reluctance to leave it. It only remained for him to make such reductions in the establishment as were possible. Some of the civil officers were discharged and others transferred to Port Dalrymple, the military guard was reduced by one-half, and most of the convicts were withdrawn, some being removed to Port Dalrymple and the remainder to Port Jackson. With the few small vessels available for the service, the difficulty of approach to the island, and the storms which on more than one occasion disabled the badly found and unseaworthy ships, the removal of even a small part of the people was a tedious business, extending over many months. By the end of 1805 about 250 people had been removed, leaving more than 700 still on the Island. The stores were for the most part transferred to Port Dalrymple and the Derwent. A large quantity of the salt pork sent to the latter settlement was condemned as unfit for human food.

In accordance with Lord Hobart's instructions, Major Foveaux resigned his charge on 12th February, 1805, when the reductions began. Captain John Piper, the senior military officer, took his place as Commandant. If Holt is to be trusted, Captain Piper's rule presented a favourable contrast to that of Foveaux, both in the humanity and consideration he showed to those under him and in his general conduct. To Piper was left the troublesome and unpleasing task of superintending the removal of the settlers. With but few exceptions they obstinately refused to stir. The first to leave were five settlers who sailed with Foveaux to Sydney, and thence proceeded to Paterson's Settlement at Port Dalrymple, where they arrived in April, 1805. These were the first Norfolk Islanders to settle in Van Diemen's Land. Paterson wanted them to take up their locations on the Supply River on the west bank of the Tamar; but they chose their allotments on a creek two miles south-east of York Town. The soil on the hills was bad, the flats were liable to floods. Their crops turned out so poor that they threw up their locations, and Paterson eventually gave them fresh grants in the fertile country on the banks of the South Esk, somewhere in the neighbourhood of

Longford. Seven months later two more of the Norfolk Island settlers found their way to the banks of the Tamar.

With a disabled little warship and a couple of small schooners for his whole available fleet, King had to look for some chance private ship to remove stores and people from Norfolk Island. In September, 1805, the *Sydney* arrived at Port Jackson from India. As she was bound to the Derwent for oil, King agreed with Captain Forrest to touch at Norfolk Island on the way and take a cargo to Collins' settlement. For this charter he paid the captain £600. He had by this time relented of his harshness to Holt, and given him permission to leave his place of exile, so that when the *Sydney* sailed from Norfolk Island on the 1st of November, Holt took a passage in her and paid a visit to the new settlement of which he has left us a lively account in his journal. In the *Sydney* also there came the first Norfolk Island settler to the Derwent—George Guest—who brought a wife and six children and also 300 ewes, of which only 265 survived the three weeks' passage. Of 200 ewes belonging to Government, shipped at the same time, only 148 were landed. Six head of cattle arrived safely.

Thus, at the end of 1806, after the exertions of more than two years, only eight settlers with their families had been prevailed upon to remove to Van Diemen's Land. The convicts had been nearly all withdrawn, the military guard reduced to 25 men, but there were still 700 people on the island, a number nearly equal to the combined population of the two recently founded settlements in Van Diemen's Land, viz., Hobart, 471; Port Dalrymple, 301; total, 772. Lord Hobart's despatch ordering the deportation of the settlers was dated June, 1803. If it had taken more than three years to move eight settlers, how long would it take to remove 700? The Colonial Office was beginning to grow impatient, especially as news had arrived that there was once more a bad harvest at Norfolk Island.

Accordingly, in December, 1806, the Secretary of State wrote a peremptory despatch on the subject to Governor Bligh, who had succeeded King as Governor of New South Wales. In this despatch Lord Norfolk recapitulated the reasons which had led Lord Hobart more than three years before to decide on the evacuation of the island. He remarked with dissatisfaction that the measures hitherto taken had had little effect in promoting the object of freeing the Government from the expense of an unproductive settlement; that it was plain that the crops were less satisfactory each year, while the expenses were ever increasing; that Port Jackson would soon be self-supporting, while Hobart Town and Port Dalrymple appeared to have everything to recommend them in regard to

climate and fertility. It was now evident to the Government that no advantage could arise from the partial evacuation of Norfolk Island, and he therefore gave orders that measures were to be taken forthwith for the withdrawal of all settlers and stock and their removal to the new settlements in Van Diemen's Land, on the terms recommended by Foveaux nearly two years before, with certain modifications. The settlers were to be compensated for what they had to leave behind, the money compensation not to exceed £1000, and they were to have grants in the proportion of two acres only to one acre of cultivated land surrendered. On the other hand they were to have houses erected of value equal to those given up; were to be victualled for two years at the public cost; those of the better class were to be allowed the labour of four convicts for nine months and of two for fifteen months, those of less desert being allowed lesser privileges.

The deportation now began in earnest. H.M.S. *Porpoise*, the armed tender *Lady Nelson*, and the *Estramina* were to remove the people and their stock. Governor Bligh gave the settlers their choice between Port Dalrymple and the Derwent. Most of them chose the latter settlement. He then gave Collins notice to be ready to receive 120 settlers and their families, 386 souls in all, and at the same time sent him seven months' supplies.

The first vessel to arrive (28th November, 1807) was the armed tender *Lady Nelson*. She was already well known at the Derwent. In 1803 she had brought to Risdon a portion of Bowen's party, and had assisted at the founding of Hobart by Collins in February, 1804, and she now brought the first detachment of settlers deported from Norfolk Island. They consisted of 15 families, comprising 34 persons. Three months later (17th January, 1808) came the *Porpoise* with 43 families, altogether 187 persons, and on the 2nd March the *Lady Nelson* brought a further instalment of 50. Another three months saw the *Estramina* arrive with an additional 62. Thus in little more than six months Collins had had 330 people thrown on his hands with but little means to provide for their wants. Many of them were in a most wretched condition, and immediately applied to Collins for clothing and bedding which it was not in his power to give them. They had come with the expectation that all their wants would be provided for by the Government. All Collins could do was to billet the majority amongst the inhabitants. Some few he assisted to build houses for themselves. Some few he found sufficiently skilful to be employed at wages on the works he had then in hand, the principal of which was the large brick store which still stands at the bottom of Macquarie-street. Some of the new arrivals received their grants of land in the neighbourhood of the settlement at Sandy

Bay, but the greater part were fixed some 20 or 30 miles up the river, at a new settlement which, in memory of their old home, was called New Norfolk. The sudden accession of over 300 people to a small community which did not number 500 was a great strain on Collins' resources. His supplies were scanty enough, and when he learned that still more people were coming, and that he was to have thrust him upon more than double the number which Bligh had led him to expect, he was loud in his complaints both to the Home Authorities and to Sydney at the want of thought with which he had been treated.

In the meantime a little revolution had taken place in Sydney. Governor Bligh had been deposed by the officers of the New South Wales Corps, and the government had been assumed by Colonel Johnston. The work of removal from Norfolk Island was then pushed on even more rapidly. Colonel Johnston chartered the *City of Edinburgh*, a vessel of 500 tons, to remove the rest of the settlers. The deposed Bligh, in his despatches to the Secretary of State, protested strongly against the folly of crowding a host of people into a settlement so ill prepared to receive them, a proceeding which must, he foresaw, involve the whole population at the Derwent in great distress.

Already there were loud complaints from the Norfolk Islanders of the hardships they had had to endure, so different from what they had been led to expect from the representations made to them when they left the island. Many of them were in the most destitute condition, and were glad to compound their claims against the Government by taking a few live stock as compensation for the houses and effects they had left. Probably, however, their own improvident habits were their worst enemy. Foveaux states that a ship named the *Rose*, belonging to Campbells, of Sydney, had touched at the Derwent on her way from England. In direct contravention of his orders from head quarters Collins allowed the Captain to land several thousand gallons of spirit for sale. He further permitted it to be sold to the new arrivals, who parted with their little store of salted pork to the Government store to raise money to purchase the spirits. Thus, many in a few days dissipated the whole of their small means of subsistence.

The *City of Edinburgh* sailed from Sydney to remove the rest of the settlers on the 26th May, 1808; she met with a succession of heavy gales, and was repeatedly blown off the island, so that she did not complete her loading for more than three months; she sailed from the island on the 9th September, carrying 226 people to the already overcrowded settlement at the Derwent, where she arrived on the 2nd October. The unfortunate people suffered much on the long voyage of nearly

a month, and complained that they had been plundered on the way of much of their small property. The greater number were in a most destitute state—almost naked—and their arrival necessarily increased the prevailing distress at Hobart. The population of the settlement had been more than doubled by the 554 people who had come from Norfolk Island, and now stood at over 1000. Floods on the Hawkesbury in New South Wales had destroyed nearly the whole crops in March, 1808, and the Governor at Port Jackson could spare nothing in response to Collins' urgent appeals for help.

It is true that the Norfolk Islanders had brought some store of provisions, but a quite insufficient supply, and the Derwent settlement, as yet, produced practically nothing. In view of his probable necessities Collins some time before had made an agreement with Campbell, of Sydney, to bring him 500 head of Bengal cattle from India, but Lieut.-Governor Foveaux had set aside the contract as too costly, which was perhaps wise, as the shipment would have cost the English Exchequer some £20,000.

The Derwent settlement was now in great straits for food. The ration of salt meat had long since been reduced to one-half. There were only a few weeks' full rations in hand, and starvation was staring them in the face. Collins got some few stores from the rare vessels which touched at Van Diemen's Land, but this was a mere trifle. His only resource was to fall back on what the bush yielded. He therefore issued an order offering 1*s.* per lb. for all the kangaroo meat brought into store.

For the next year or two it was a struggle at Hobart Town for bare existence, and the people were on the verge of absolute starvation.

Lieut. Edward Lord, in his evidence before a Committee of the House of Commons in 1812, said that the whole settlement for a considerable time lived on kangaroo, not having a bit of other provisions. He says :—"During the great scarcity, when we lived for 13 months, except at small intervals, upon 2 lbs. of biscuit per week, we had not a single death. We were living on the wild game of the country. The people certainly suffered great inconvenience and very great privations from want of provisions. I have often myself been glad to go to bed from want of bread, and have often been without the little comforts of wine and sugar."

Kangaroo meat brought 1*s.* 6*d.* per lb. Later the *Sydney* was chartered to bring wheat from India, but she was wrecked. The *Venus*, Capt. Bunker, was then despatched. She was more fortunate, arriving in 1810 with a cargo of wheat, which at last relieved the inhabitants from their dread of famine. Wheat sank from £4, or even £6 per bushel, to 12*s.*

With respect to Norfolk Island, it was found undesirable, if not impossible, to abandon it entirely. There was still a herd of cattle and also some 3000 sheep which could not be at once removed. A small party was to be left to look after the stock and to try whether it was possible to cultivate coffee. Captain Piper reports, 30 Sept., 1808, after sailing of the *City of Edinburgh*, that there were still 250 persons on the island.

From the Report of the Parliamentary Committee above quoted it appears that in 1812 the Island was not wholly deserted. There were still a few settlers and some soldiers. A Return, dated 30 April, 1810, shows 98 free persons (of whom 61 were men) and 26 convicts, the military and officers numbering 53; total, 177.

The settlers from Norfolk Island were given lands at New Norfolk and Sandy Bay, at Pittwater (Sorell), and Clarence Plains in the South, and at Norfolk Plains on the Northern side of the Island. These grants were at first small, seldom exceeding 40 acres. A certain proportion of the Norfolk Islanders—especially the marines and sailors who came out with Governor Phillip in 1788, and went to the island with King, and some of the crew of the *Sirius*—who had prospered in Norfolk Island, prospered also in Van Diemen's Land, and their families have continued to hold respectable and honourable positions in this Colony. But, as a rule, the Norfolk Island settlers did not add much to the welfare and progress of the settlement at the Derwent.

The great majority, idle and improvident in their old home, did not improve by removal. They were content to draw their rations from the stores so long as that privilege was allowed them, and then bartered away their grants for a trifle, to sink out of sight in poverty and wretchedness.

AN ACCOUNT of the Settlers, Free Persons, and Prisoners received into this Settlement from Norfolk Island from 29th November, 1807, to 1 October, 1808:—

Time received.	By what Conveyance.	Settlers and Free Persons.	Women.	Children.	Prisoners (Male.)	Total Number received.
Nov. 29th, 1807	H.M. Brig *Lady Nelson*	15	6	13	...	34
Jan. 17th, 1808	H.M. Ship *Porpoise*	56	39	76	11	182
March 1st „	H.M. Brig *Lady Nelson*	25	12	11	2	50
June 7th „	H.M. Colonial schooner *Estramina*	23	13	24	2	62
Oct. 2nd „	*City of Edinburgh*	83	39	96	8	226
	Total	202	109	220	23	554

LEONARD FOSBROOK, *Deputy Commandant.*

Sumatra

Java

Teyrall Rocks

G. F. de Witts Land Discovered Anno 1628 by the Dutch

Williams Rinde

The Lane of Endracht discovered by the Dutch 1628

Frick Hartogs Road

Hartmans Mirabelko

Dirkes Lane discovered Anno 1628

The Lands of Lyons discovered by y^e Dutch 1622

The Lane of Peter Nuyts discovered in the Gulfe Van Heurt by Middelburgh Jan^y Anno 1627

Abell Tasmans Passage

Pt of St Peter

Pt of St Frances

This Land of New Guinea was first discouerde to Joygne to y^e South Land by y^e Yot Lemnon as By this Chart Francois Jacobus Vis: Pilot Maior Anno 1642

Anthony Van Diemens Land Discouerde by y^e Ship Heemskerck & Zeehaen Under y^e Comand of Cap. Abell Tasman y^e 24. Hausm Ber: Anno 1642

Abell Tasmans Passage

Van Diemens Land

Rotterdam

Mouse

Amsterdam

Middelburgh

Piece torn away

The 3 Kings

3 Hylos Cape

Prom. Ror

Abell

Cape Peter B.

Pt of Cape

Abell Tasm

Staaten Hoeck

Clippers Hoeck

Sloa MS. N° 5222 art 12. Brit. Museum

NOTE ON AN EARLY CHART SHOWING THE TRACKS OF TASMAN'S VOYAGES IN 1642 AND 1644.

(Diagram.)

By A. Mault.

(Read April 9, 1894.)

The Government of Tasmania very liberally caused to be photo-lithographed a *fac-simile* copy which I had made of a chart showing the tracks of Tasman in his two voyages of of discovery in the years 1642 and 1644. The chart copied is in the Sloane Collection in the British Museum, and is marked on the back "Bibl. Sloan. 5222, 12. N.W. Closet 16." It is evidently a manuscript of the latter half of the 17th century, and was certainly copied by an Englishman, and probably from the original chart of Francz Jacobsz Visser, the chief pilot on board the *Heemskirk* on Tasman's first voyage, and captain and chief pilot of the *Lemmen*, Tasman's flagship in the expedition of 1644. A reduced map from the same chart is given in Major's "Early Voyages to Terra Australis," published in 1859 by the Hakluyt Society.

The Museum chart is drawn on paper in black ink, now faded. After the chart was drawn (possibly since Major's map was published) some one has added blue chalk lines, connecting Tasman's discoveries in the south of Tasmania with those he made in New Guinea on the one side, and those of Peter Nuyts on the other. In the photo-lithographs these blue lines have come out black. "Abell Tasman's passage" is marked in pricked lines. That of the 1642 voyage begins at about the longitude of Cape Leeuwin and ends at the north of the island of Ceram, the last place mentioned in Tasmans' journal of that voyage. The track of the 1644 voyage begins at the south-western coast of New Guinea, and, missing Torres Straits, goes round the Gulf of Carpentaria and the northern and western shores of Australia to Endracht Land whence he returned to Batavia. In the pricked track of the first voyage no soundings are given, in that of the second the soundings are given along the part of the passage within soundings. I therefore think this chart is a copy of that made by Francz Jacobsz during this second expedition. And there are other circumstances substantiating this opinion, notably the inscription in the middle of the chart, to which I shall again refer.

The expedition of 1644 probably started from Batavia on the 30th of January in that year, and was expected to return, if the instructions were fulfilled, in July, but as no journal of the voyage has been yet discovered this chart and a few

notes made by Burgomaster Wilson, in 1705, are the only particulars that we know about it, except the "Instructions" above mentioned, which were given to Tasman by Antonio Van Diemen, the Governor, and the Council of the Dutch East Indies, and dated at Batavia the 29th January, 1644.

With reference to the British Museum chart, of which I beg to present to the Royal Society the photo-lithographed *fac-similes*, Major says: "It bears no name or date, but is written on exactly the same kind of paper, with the same ink, and by the same hand as one by Captain Thomas Bowrey in the same volume, done at Fort S. George in 1687. It is observable that in the preface to a work by Captain Bowrey on the Malay language, he says that in 1688 he embarked at Fort S. George as a passenger for England, having been nineteen years in the East Indies continually engaged in navigation and trading in those countries, in Sumatra, Borneo, Bantam, and Java." Major goes on to say: "The twofold blunder, both as to fact and date, contained in the sentence in the middle of the chart—'This large land of New Guinea was first discovered *to joyne to y^e^ south land* by y^e^ yot *Lemmen* as by this chart Francois Jacobus, Vis. Pilot Major, Anno 1643'—is self-evidently an independent subsequent insertion, probably by Bowrey himself, and therefore by no means impugns the inference that the chart is otherwise a genuine copy."

When I saw the chart it was not bound in a volume, so I had no opportunity of comparing its paper, ink, and handwriting with those of the other chart referred to by Major, so I accept his opinion as correct that probably the copy was the handiwork of Captain Bowrey. But I cannot accept the statements that the chart bears no name or date, and that the inscription in the middle of it "is self-evidently an independent subsequent insertion." This second statement is, of course, necessary to support the first, as if the inscription is not a subsequent insertion the chart cannot be said to bear any name or date. So far from the inscription being self-evidently an independent subsequent insertion, I think the evidence all points the other way. The error in the date is no doubt the fault of Captain Bowrey, or whoever else was the copyist of the chart and translator into English of the Dutch inscriptions on the original, but I take it that the wording of it shows that it is a translation of the chief pilot's inscription on the chart he prepared and sent in as the official return to the orders of the "Instructions" with reference to discovering "whether Nova Guinea is one continent with that great southland." It is barely possible that Bowrey could have known of this instruction, which the original writer of the inscription must evidently have known to be the great object of the voyage of the *Lemmen* and her consorts.

The expedition of 1644, under the command of Tasman as commodore, consisted of the yacht *Lemmen*, with a crew of 45 sailors and 11 soldiers, under the subordinate command of skipper chief pilot Franz Jacobsz Visser ; the yacht *Zeemeuw*, with 35 sailors and six soldiers, under the command of Skipper Dirk Cornelisz Haan ; and a smaller yacht as tender, the *Brak*, with 14 sailors, under the command of Skipper Jasper Jansz Koops. The yachts were plentifully provisioned for eight months. The instructions issued to Tasman, which were discovered at Batavia, and published a little more than a hundred years ago by Dalrymple, constitute a very remarkable document, and exemplify the prescient spirit of the leaders of Dutch East Indian enterprise, for had Tasman succeeded in fulfilling them he would have anticipated by nearly 130 years Captain Cook's Australian discoveries, and by about 150 years those of Bass and Flinders.

The instructions begin with a recital of all the Dutch expeditions that had made any discoveries in connection with the great southland prior to Tasman's voyage of 1642, concerning which voyage they say simply —"It is unnecessary to relate more here, as you are perfectly acquainted with all particulars." They thus record the discoveries made by the yacht the *Duyfhen* in 1606, on the east side of what we now call the Gulf of Carpentaria ; of D'Edel's Land in 1617, on the west coast of Australia ; of Endraght Land further north in 1618-1622 ; of Arnhem's Land on the west side of the Gulf of Carpentaria in 1623 ; and of Peter Nuyt's Land on the south coast in 1627. It will be noticed that the discoveries above-named, together with the lands discovered, or seen, by Tasman in his two expeditions, are the only lands shown on the chart, and to this fact I shall refer further on.

The instructions then proceed thus:—"But to obtain a thorough knowledge of these extensive countries, the discovery whereof has been begun (in consequence of the intention of the Company and the recommendation of our masters), [there] now only remains for the future [to find out] whether Nova Guinea is one continent with that great southland, or separated by channels and islands lying between them; and also whether that New Van Diemen's Land is the same continent with these two great countries, or with one of them ; or, if separated from them, what islands may be dispersed between Nova Guinea and the unknown southland, when, after more experience and knowledge of all the said known and unknown countries, we shall be better enabled for further undertakings."

Then follow the actual instructions as to what Tasman was to try to do. He was to make his way by the islands in the Banda Sea, Teninber, Key and Aroum (marked T. Acaga on

the chart) to False Cape, which was then thought to be part of New Guinea, and is in 8 deg. south latitude. Thence he was to sail along the south coast of New Guinea till he reached 9 deg. of south latitude, where there was a large cove, which might be the opening into the South Sea. Into this he was to send the tender, the *Brak*, for two or three days to try and find a passage. If one were found he was to follow it until he reached the furthest known discovered land of the east coast in 17 deg. of south latitude (? 7 deg.), and then follow the trend of the coast eastward and southward as it might run until he reached his own discovery of the New Van Diemen's Land. Thence he was to go north-westwards to the islands of S. Peter and S. Francis lying off Peter Nuyt's Land, and try and find another passage between them and the southland eastward into the South Sea again. If this other passage were discovered he was to return by it to S. Peter and S. Francis. In any case he was to return from these islands by the south and west coasts until he reached Wilhelm's River between Endraght Land and De Witt's Land in 22 deg. south latitude, "when the known southland would be entirely circumnavigated and discovered to be the largest island of the globe."

We all know that the fulfilment of these instructions is quite feasible. The "large cove in 9 deg. south latitude and to the south-west of False Cape is the western part of Torres Straits, and the pricked line of Tasman's passage shows that he passed near to the entrance of Endeavour Strait, between the Prince of Wales Island and Cape York, by which Captain Cook entered Torres Straits in 1770. It is at least singular to note that the dotted line showing the edge of shoal water that is drawn across the cove is not also drawn across Endeavour Strait. And in the south, a course easterly from S. Peter and S. Francis would have taken Tasman past the Great Australian Bight and through Bass Straits. We shall probably never know whether Tasman did send the *Brak* into the cove or strait to report, and if he did why the passage through was not discovered. All that we know is that he did not pass the strait, but instead of doing so fulfilled the alternative course pointed out in the instructions. Before finishing with this part of my subject, I cannot forbear from again calling attention to the prescience of the Dutch authorities in having in the manner mentioned thus indicated the real position of the straits that give passage to the north and south of Australia from the Indian Ocean to the great South Sea, as they certainly knew nothing of what Torres had done. Fifty years after Dampier still held to the opinion that there was a great intermediate passage something like that shown on medieval charts as running between Little Java

and Great Java; and a hundred and fifty years after Flinders did not think a strait or, at least, a great river from a central sea quite improbable.

The alternative instruction to be followed in the case that no passage to the eastward was found at the great cove in 9 deg. south latitude is thus given:—"But if (as we presume) the land of Nova Guinea is joined to the southland, and in consequence is one continent, you will be enabled by the S.E. trade wind to run along the north coast from 7 deg. to 22 deg. south, and thus entirely to discover this land." It is evident from this that Van Diemen and his Council at Batavia thought that Arnhem's Land was an island, and that the western part of the northern shore of Australia trended westward from the southern end of the Gulf of Carpentaria to about North-West Cape in De Witt's Land and north of Endraght Land. On arriving at Endraght Land, Tasman was—time and weather permitting—to go on southwards to Houtman's Abrolhos and try to recover the treasure lost there in 1629 by the wreck of the *Batavia*. He was also to inquire after two of the mutineers of the crew of that ship, who had been marooned instead of being executed with their companions. It seems from the chart that Tasman did not go south of Endraght Land to fulfil these latter instructions. Probably the time he had taken to get round the gulf and then follow the coast of Arnhem's Land and De Witt's Land to his turning point at about 23 deg. south had pretty well exhausted his provisions and water. I cannot help thinking that the question of victualling his ships had something to do with the non-fulfilment of the instruction as to finding a passage through Torres Straits. The voyage that the fulfilment of that instruction would have entailed would have been one of at least 13,000 miles, and mostly in unknown waters, and without much sea room if coast charts were to be made. Judging from his previous voyage, this would have taken at least 13 months, and he had only eight months' provisions.

To revert to the chart, the sailing instructions given fully bear out with regard to what Tasman was to do what I called your attention to in connection with what had been previously done, namely, that the chart refers to only Tasman's expedition—that all the information given upon the chart is given in connection with or in consequence of the instructions. As this is so, I do not see how we can resist the conclusion that the Dutch original from which it was taken and translated was the work of Franz Jacobsz, Tasman's chief pilot on both of his expeditions, and that the inscription in the middle of the chart is a translation of Jacobsz's own writing. The material information upon which the chart is constructed was all in Jacobsz's possession, and in no other person's except Tasman's. That information was

derived from three sources: First, from the records of the previous voyages referred to in the instructions; secondly, from the record of Tasman's expedition of 1642; and thirdly, from the records of the expedition of 1644. With regard to the first of these sources, the recital of the previous discoveries in Nova Guinea and the southland, and the instructions as to what was to be done in regard to connecting them could not have been understood, unless charts were furnished showing the relative positions, and from these charts the eastern side of the Gulf of Carpentaria, the north-eastern part of Arnhem's Land and De Witt's Land, Endraght Land, D'Edel's Land, Leeuwin Land, and Peter Nuyt's Land would be laid down. With regard to the second source of information, an examination of the chart will show that the original of it was made by some one who had access to not only to Tasman's chart but also to his journal of the voyage of 1642-3, as the notes made on the north coast of Guinea are similar to those contained in the journal. When all the information to be obtained from these two sources was laid down upon the chart it would be as complete as it now is with the exception of the new land discovered in the course of the voyage of 1644. And the coast line of this new land, and the pricked line of the passage made while discovering it, is all that Jacobsz refers to in his central inscription.

Another argument in favour of the inscription being a copy of Jacobsz's attestation of the chart, and not an independent subsequent insertion of Bowrey, is that the name of New Guinea is applied to the new discovered land. Very shortly after the expedition of 1644 the newly-discovered land was called New Holland, and if Bowrey had written an independent title to his copy he would probably have thus named it. Dampier, who was on this coast in 1688, and again in 1699, always calls it New Holland.

It is evident that the Dutch authorities made no secret of Tasman's discoveries on this voyage, but that charts of it were published, or at least allowed to be copied. It is probable that Bowrey was thus allowed to make the copy in the Sloane collection. Dampier had a copy with him during his expedition of 1699, when he was in command of one of the king's ships. It evidently was similar to the one before us, for he complains of Tasman's (Mr. Tasman he politely calls him) inaccuracies in latitude. He gives two latitudes from the charts he refers to, one being that of the Abrulhos, which he mentions as erroneously laid down at 27 deg. 28 min. south, and the other being the Archipelago, now called after Dampier, which he says Mr. Tasman lays down in 19 deg. 50 min. instead of 20 deg. 21 min. south. The chart before

us gives the latitudes Dampier says are wrong, so he evidently had a copy of the same original. With respect to these latitudes, I may mention that in the case of the Abrulhos Dampier is wrong, but in that of the Archipelago he is right.

I have referred to the prescience of the Dutch authorities in geographical matters as shown by the "Instructions." The instructions also illustrate their—shall I politely call it their keenness ? in trading matters. Tasman is told when "shewing the samples and goods, you and the junior merchants are carefully to remark what goods the strange nation most esteem, and to which they are most inclined ; likewise inquire what merchandise and goods they possess, particularly after gold and silver, and whether these metals are held in great esteem ; to keep them ignorant of the precious value seem not greedy after it ; if they offer to barter for your goods, seem not to covet these metals, but shew them copper, zinc, pewter, and lead as if these were of more value to us. If you find them inclined to trade, keep the goods which they seem most greedy after at so high a value that none may be sold or bartered without great profit." And so on.

To return to the instructions : If Tasman had fulfilled them and sailed round Australia and also round Tasmania, what would have been the result ? Would Australian history have taken another course ? I do not think so. The Dutch are a trading people rather than a colonising one. These expeditions of Tasman were solely for the purpose of opening new markets, and as they did not have that effect, on account of the low condition of the people, both in regard to numbers and attainments in the countries of the Australian continent and islands, they had no other effect. In due time the English entered into possession, and it is interesting to note how in the early days of their colonisation the claims of the Dutch were evidently admitted to the west or New Holland side of the continent, by limitations in the commissions of the Governors of New South Wales.

NOTES ON SOME TASMANIAN CHITONS.

By Mr. W. F. Bednall (Corresponding Member of the Royal Society of Tasmania).

(Read April 9th, 1894.)

Some time ago I received from Captain Beddome, of Hobart, several specimens of three species of Chitons, labelled respectively *Chiton speciosus*, *Chiton australis*, and *Chiton liratus*. At the time they came to hand the South Australian forms were engaging my attention, and I at once saw that there must be some mistake in regard to those sent under the names of *speciosus* and *liratus*, as they could not be made to answer the original descriptions of those species, but the difficulty of satisfactorily identifying them by reference to the literature at my command compelled me to put them aside for the time being. A few months since some Chitons collected by Dr. Perks at Port Elliot, Encounter Bay, were submitted to me for examination, when I recognised that they were identical with the specimens sent to me by Captain Beddome as *Chiton australis*, Sowerby, and I so labelled them; further, I exhibited an example before the Royal Society of South Australia as an interesting addition to the molluscan fauna of this colony. Having, however, since had the privilege of studying the exhaustive work of Mr. H. A. Pilsbry on the *Polyplacophora* (Chitons) as part of Tryon's Manual of Conchology, I found I had been too hasty, and had fallen into the too common snare of accepting a name under which a species is popularly known, and that, instead, the shell was the closely allied *Chiton novœhollandiœ*, of Gray. To satisfy myself more thoroughly I procured typical Port Jackson specimens of *C. australis* from Mr. C. Hedley, of the Australian Museum, while almost at the same time I received two examples from Mr. G. B. Sowerby, of London, labelled *C. australis*, one of which, however, proved to be *C. novœhollandiœ*, Gray. The means now being at my command, I resolved to deal with the forms received from Captain Beddome, and to submit the results to your Society. For the benefit of Tasmanian conchologists I shall quote the descriptions of the species from the Manual of Conchology very fully.

Ischnochiton haddoni, Pilsbry, 1892. Tryon's Manual of Conchology, Vol. XIV. (Polyplacophora) page 88, pl. 22, figs. 67-73.

Chiton longicymba. Sowb. Conch. Illust. f. 67.

„ „ Reeve. Con. Icon. species 163.

Lepidopleurus longicymba, Angas, in his Lists of the Mollusca of South Australia and of New South Wales, in the P.Z.S. of London.

Ischnochiton longicymba, Carpenter. MS.

" " Haddon, Challenger Report, Polyplacophora, p. 17.

Also *Chiton longicymba* of Australian collectors, but NOT *chiton longicymba*, Quoy and Gaimard. "Shell distinctly keeled on the back; *scales of the girdle beautifully regular in size and arrangement, and evenly and deeply grooved.* Sculpture and colour pattern like *I. longicymba.* Interior white, greenish, or bluish; anterior valve with 10, central 1, posterior valve 12 slits; teeth thin, sharp. *Posterior tooth of the intermediate valves long, extending almost to the posterior lateral angle of the valve, and not terminating abruptly.* Length 27, breadth 12 mill.

"The colouring is even more variable than in the New Zealandic *I. longicymba*; some specimens are clear, light greenish buff; some are brown, speckled all over with olive black; some are mainly red or black, having a wide white dorsal stripe."

Port Jackson, N.S.W., South Australia (common), Tasmania.

Mr. Pilsbry writes:—"Having examined extensive suites of specimens of the *longicymba* type from New Zealand and Australia, I find myself compelled to separate specifically those from the latter locality, although in general appearance, colour, and sculpture they certainly resemble the true *longicymba.* The differences indicated (in italics) seem to be remarkably constant and readily recognised if one takes the trouble to look for them. It must be admitted, however, that to thoroughly examine a small Chiton involves some little trouble; and therefore we must feel no surprise if the superficial collector, and the often no less superficial author, continue to confound species which are really distinct. It must be said, however, that the confusion of these two species has probably been due to the lack of specimens from the two localities for comparison, else the differences would hardly have escaped writers so careful and observant as Carpenter and Haddon."

I examined every specimen sent to me by Captain Beddome, and found that all belonged to the Australian *Haddoni*, and not to the New Zealand *longicymba*.

The foregoing species was received from Captain Beddome as *Chiton speciosus*, Adams and Angas. The *C. speciosus* was described in P.Z.S., 1864, p. 192, from specimens obtained by Mr. Angas on Yorke's Peninsula, South Australia. It is

a synonym of *Chiton contractus*, Reeve, Con. Icon., species 78 (1847), the habitat given being New Zealand. *Ischnochiton contractus* is a common South Australian species, and is credited to Tasmania by Mr. Pilsbry on the authority of the Cumingian collection.

ISCHNOCHITON (ISCHNORADSIA) NOVÆHOLLANDIÆ (Gray MSS. in Brit. Mus.), Reeve, Con. Icon. Species 142 (1847).

Chiton (Lophyrus) australis, Sowerby. Tenison Woods Census of the Marine Shells of Tasmania (1877).

Received from Captain Beddome as *Chiton australis*, and also from Mr. W. Legrand under the same name over twenty years ago.

The following are the essential portions of the descriptions of the two species, transcribed from the Manual of Conchology :—"*I. novæhollandiæ.*—Shell oval-oblong, elevated, the dorsal ridge angular, side slopes nearly straight ; colour green, minutely marbled with olive, the lateral areas darker. Lateral areas sculptured with *low, uneven, somewhat nodulous radiating riblets, and some concentric growth wrinkles. Central areas smooth except for a very dense and regular microscopic granulation.* End valves having radiating riblets. Interior blue green, with pink and olive rays. Girdle covered with smooth, solid, pebble-like scales, which toward the outer edge are subcarinated. Length 43, breadth 23 mill. Adelaide, South Australia."

I may here state that there is no locality in the immediate neighbourhood of Adelaide where this shell is likely to be taken.

Encounter Bay, S.A. (Dr. Perks, Professor Tate.)

Tasmania, where apparently it is a common species.

"*I. australis.*—Shell oval oblong, moderately elevated, the dorsal ridge sub-angular, side slopes nearly straight. Colour dark olive brown, the apices of the valves pink when eroded. Lateral areas sculptured with *close uneven riblets, which usually bifurcate or branch freely, especially toward the posterior margin of the area. Central areas closely and evenly sculptured with finer longitudinal riblets*, obsolete on the ridge, where they give place to a dense microscopic granulation. End valves sculptured with close radiating riblets, those of the posterior valves irregularly granose. Interior light blue-green, with two wide pink rays in each valve, and behind them two olive-brown rays. Girdle wide, closely covered with conspicuous,

convex, pebble-like scales, which toward the outer edge are subcarinated in the middle. Length 62, breadth 35 mill. Port Jackson."

Attention to the italicised words in the foregoing descriptions will show the outside difference existing between these two species, and a study of the specimens now at my command has satisfied me that the Tasmanian and South Australian shells are identical, and are *C. novæhollandiæ*, Gray, and not *C. australis*, Sowb., as given in Tenison Woods' Census of Tasmanian Marine Shells. Neither have *C. concentricus*, *C. muricatus*, or *C. smaragdinus* anything in common with the present forms, as suggested by Mr. Woods, the two former being true Chitons, and the latter a typical Ischnochiton as restricted. The Port Jackson specimens are typical *australis* in every particular. Of the Tasmanian shells I have six, and of the South Australian I have examined eight (a gradation of sizes in each case). In the most perfect of those from Tasmania there are superficial signs of the longitudinal riblets on the central areas at the extreme sides in front of the diagonal lines, as also are there on the two largest of the South Australian ones. I do not note any concentric growth wrinkles on the *C. australis* from Port Jackson, but they seem to be more or less present in the *C. novæhollandiæ* from both localities mentioned, in which also the radiating riblets of the terminal valves are more or less broken up into concentric granulations. The two specimens received from Mr. Sowerby are labelled "Australia," and comprise one of each species.

CHITON PELLISSERPENTIS. Quoy et Gaimard., Voy. de l'Astrolabe, Zool. iii., Moll., p. 381, t. 74, f. 17-22 (1834).

C. pellisserpentis, Reeve, Con. Icon., species 84.

" " Hutton, Cat. Mar. Moll, N.Z., 1880, p. 111.

"Shell oval, rather elevated, hardly carinated, the side slopes somewhat convex. Surface lustreless. Colour a rather dull and dingy olive or olive-green, marked with black along the ridge, and on the sides of some valves. The lateral areas moderately raised and sculptured with *three or four rows of distinct tubercles.* Central areas having *strong, irregular growth wrinkles, and fine longitudinal riblets.* Anterior valve larger and much more elevated than the posterior, both being sculptured with numerous regular rows of distinct tubercles, the rows increasing by splitting. Posterior valve depressed, the low mucro in front of the middle. Inside blue, indistinctly blotched with olive-green. Sutural plates rounded, the sinus broad and deep, smooth or hardly denticulate.

Anterior valve having 12, central valves 1, posterior valve 12 slits, teeth blunt, pectinated. Eaves broad. Girdle wide, *alternately light and dark;* scales rather large and wide, often showing a slight tendency to carination in the middle, microscopically striated. Length 30, breadth 23 mill. New Zealand."

It may be here mentioned that in order to satisfactorily determine a chiton by all its essential characters, which particularly include the internal ones, such as the sutural plates, sinus, slits, etc., it is necessary to take the shell to pieces.

Received from Captain Beddome as *Chiton liratus*, Adams and Angas, and under which name I am informed it is labelled in the museum collection at Hobart. *C. (Lepidopleurus) liratus* was described with other South Australian Chitons, including *C. (Lepidopleurus) speciosus* by Messrs. Adams and Angas in the P.Z.S, 1864, from specimens gathered by Mr. Angas on Yorke's Peninsula, S.A. I have not yet myself been successful in determining the *C. liratus* from among our South Australian Chitons, but at any rate no South Australian specimen of *pellisserpentis* exists in any local collection. Again, the Tasmanian shell is a true Chiton, whereas *liratus* of A. and A. is an Ischnochiton. In concluding that the Tasmanian shell is *C. pellisserpentis* and not *C. sinclairi*, which is closely allied to it, I have relied on the circumstance that in the specimens in my possession (five) the broad sinus shows an "absence or absolescence of teeth," and also on the colouring of the girdle, which is alternately light and dark. The figure in Reeve well illustrates the species.

Chiton sinclairi, Gray. Dieffenbach's Travels in New Zealand, Vol. 2, p. 263 (1843).

As this shell is closely related to *C. pellisserpentis*, and as it has been recorded from Tasmania, although that locality has been doubted by the late Rev. J. E. Tenison Woods, I have extracted the full description as given in the Manual of Conchology for the benefit of Tasmanian conchologists.

"Shell oval, rather elevated, the *dorsal ridge rounded*, side slopes rather straight; *brown-black*, each valve *irregularly and raggedly striped with whitish*; the head valve pale with dark rays. Sometimes the white predominates. The lateral areas are raised and sculptured with *three or four radiating granose ribs, often sub-obsolete.* Central areas *smooth in the middle except for a few growth wrinkles*, but having *fine short longitudinal riblets at the sides in front of the diagonal line.* These riblets are sometimes almost obsolete. Head valve sculptured at first with about 15-18 granose riblets, but as they have a tendency to split as the valve grows, the number in a grown

specimen is usually 24-30. Tail valve having a low, obtuse mucro, decidedly in front of the middle. Interior bluish. Sinus rather wide, denticulate, the area behind it porous. Anterior valve having 11, central valves 1, posterior valve 14 slits ; teeth obtuse, strongly crenulated. Eaves broad, spongy. Girdle covered with large convex scales, which are very finely, sharply striated. Length 28, breadth 18 mill. Another specimen length 17, breadth 11 mill."

Those portions of the description printed in italics emphasise the salient features of the species.

Mr. Pilsbry says:—"The smooth polished central areas, grooved only along the diagonal line at the sides, and the granose-ribbed lateral areas and end valves are characteristic. The black and white colouring is also constant. The sculpture of the side areas varies greatly in strength. This species has been reported from Tasmania, but on doubtful authority."

The *Conchologia iconica* (Monograph of Chiton, published in 1847) gives "Van Diemen's Land" as the habitat of this shell on the authority of Dr. Sinclair, R.N. Presumably, as this Chiton is named after Dr. Sinclair by Gray as a New Zealand species, the locality given by Reeve four years afterwards may be an error.

Reeve's notes to this shell in Con. Icon. is :—"Very closely allied to *C. capensis* and *C. pellisserpentis*, but distinguished from both by the peculiar structure of the granules, which, to use a mournful comparison, have an appearance like the nails on a coffin."

C. sinclairi is included in Tenison Woods' Census of the Marine Shells of Tasmania (1877), with the following remarks :—"A New Zealand shell, whose Tasmanian habitat is doubtful."

Turning to Professor Hutton's Manual of the New Zealand Mollusca (1880), when I had written the larger part of this paper, to read the description given by him of *C. pellisserpentis* I was astonished to find myself accredited as an authority (bracketed with Reeve) for giving Tasmania as a habitat for *C. sinclairi*. Although I have been in possession of a copy of this book from the time of its publication by the courtesy of Professor Hutton, I do not recollect having noticed this before. It must assuredly have been a *lapsus calami* on the part of the Professor (Beddome, no doubt, being intended), for I never possessed the species till about two months ago, when I received examples from Mr. G. B. Sowerby, of London, labelled "New Zealand."

C. sinclairi may certainly be looked for in Tasmania, although the affinities of the fauna of the island are with Australia and not with New Zealand.

NOTES ON A NEW SPECIES OF PEDALION FOUND IN THE SOLOMON ISLANDS.

By V. G. Thorpe, F.R.M.S., H.M.S. Penguin.

(Corresponding Member.)

(Read April 9, 1894.)

The paper I have the honour to read before this Society might be entitled, with some truth, "The History of a Lost Opportunity." In a paper which I read before the Royal Microscopical Society of London, in 1889, on a "New Species of Megalotrocha," I spoke of Dunk Island, off the coast of Queensland, as follows:—"One meets with a tiny pool, not more than three or four feet across, on the bleak and rocky headland of an island out at sea, exposed to the storm and to the glare of a tropical sun, breakers beating on the rocks below within twenty feet of it, and yet, strange to relate, I found the water of such a solitary and lifeless pool literally swarming with a wonderful pedalion." But at that time (1888) I did not realise that this rotifer was a totally distinct and new species. Last August (1893) whilst examining some water collected in the artificially hollowed-out trunk of a cocoanut tree, made by the natives of New Georgia for drinking purposes, and growing on a small island in Rendova Harbour, Solomon Islands, I once again came across this pedalion in considerable numbers. Then I recognised my old friend of the Australian coast, and realised that it was a new species, differing in essential details from the only known species of Pedalion, *P. mirum*. Before I could, however, complete my examination of this rotifer, the news arrived that this same species had been discovered by Dr. Levander, of Helsingfors, in Finland, in October, 1892,* and had been named by him *P. fennicum* four years after I first had seen it.

The genus "Pedalion" can with truth be regarded as one the great discoveries of the nineteenth century. As late as the year 1871, the true position of the Rotifera in the animal kingdom was a matter of keen dispute. At first classed with the Infusoria, they were afterwards raised by some observers to the level of the Crustacea, whilst others placed them among the Vermes (worms). In that year Dr. C. T. Hudson discovered in Clifton, England, a rotifer, for which not only a new genus had to be formed, but also a new family, whilst

*Curiously enough, like mine "in a little pool, about two yards square by a foot deep, ten yards from the sea-shore, and not a yard above the sea-level; no vegetation; grey detritus on the bottom; the water moderately clear; sweet."

a new order was created for its reception as well as the reception of *Hexartura polyptra*, another extraordinary rotifer found in Egypt in 1853, but never seen since. This new rotifer, named by Hudson *Pedalion mirum*, resembled in its general conformation the Namplius larva of one of the freshwater Entomostraca. Not only did it possess, in common with other rotifera, a ciliary wreath on its head, by the movements of which it was driven through the water in a manner somewhat similar to that of the screw of a steamship, but it had in addition six limbs, which enabled it to skip several times its own length. Here then we have in Pedalion the connecting link between the two sub-kingdoms, Vermes and Arthropoda.

For a long time England was Pedalion's only home. But it has since been found in several others parts of the world. I myself have come across it in China, the waters of which literally swarm with beautiful microscopic organisms, and also in the desolate volcanic island of Ascension in the middle of the Atlantic Ocean.

Now a second species of this wonderful genus has been discovered, mounted specimens of which are now under the microscopes on the table.

The differences between the two species are soon told. In size they are nearly equal, viz., about $\frac{1}{125}$ inch in length, though I think that the new *P. fennicum* is rather broader than *P. mirum*. If you will glance at the sketches of these two rotifera, you will see (marked *a*) two peculiar stylate processes projecting from the posterior end of the body of *P. mirum*; these are absent in *P. fennicum*. Taking into consideration the six limbs, the ventral limb (mark *b*) is seen to project considerably beyond the hinder end of the body in *P. mirum*, whilst in the new species it only just reaches beyond the posterior end, and is therefore considerably shorter. There is also a marked difference in the lateral limbs. In *P. mirum*, the dorso-lateral limb (*g*) is considerably smaller than the ventro-lateral limb (*j*), whilst in *P. fennicum*, the two lateral appendages are nearly equal in size. The bristled extremities of all the limbs, but especially the ventral limbs, are more expanded in *P. mirum* than in *P. fennicum*.

Such are the main differences. The internal anatomy, as far as is known (the digestive, nervous, water vascular, reproductive, and muscular systems), is similar in both species. Only females have been found at present, many of them bearing one or two reddish eggs attached to the hinder part of the body.

ANTARCTIC EXPLORATION.

By A. Mault.

(Read April 9, 1894.)

Antarctic exploration is no new subject for discussion at the meetings of the Royal Society of Tasmania. Our founder was the hero of Arctic research, and our records contain papers by another of our distinguished Fellows—the *facile princeps* of Antarctic explorers, Sir James Ross—of whose expeditions Hobart was the base of operations. In later times one of the best records of Antarctic exploration up to date is contained in the paper read before us in 1886 by the late Deputy Surveyor-General, Charles Sprent. That paper is so complete a history of what had been done that I should not have again called your attention to the subject but for the additional information that has lately been obtained in connection with voyaging among ice under conditions totally different to those under which Ross achieved so much. The information is derivable from papers that have been recently read, and discussions that have taken place upon them at the meetings of the Royal Geographical Society and the Royal Scottish Geographical Society. I need hardly say that the new conditions under which voyaging among ice floes and bergs is being done are those connected with the use of steam.

Up to the present time no properly equipped and constructed steam vessel has crossed the Antarctic circle. The *Challenger* is the only steam vessel that has crossed the circle; and, as she was not intended for service in high latitudes, she was wholly unprotected for ice work. But the experience gained by the Dundee and Norwegian steam whalers during the 1892-93 season in the neighbourhood of Graham's Land and the South Shetlands, just north of the Antarctic circle, show very clearly under how much more favourable conditions Antarctic research can now be undertaken than when Cook and Weddell and Ross penetrated beyond the 70th parallel of south latitude.

Here is Ross's account of how he had to encounter a storm in the ice on January 19, 1842:—"At 9 p.m. the wind suddenly freshened to a violent gale from the northward, compelling us to reduce our sails to a close-reefed maintopsail and storm staysails: the sea quickly rising to a fearful height, breaking over the loftiest bergs, we were unable any longer to hold our ground, but were driven into the heavy pack under our lee. Soon after midnight our ships were involved in an ocean of rolling fragments of ice, hard as floating rocks of granite, which were dashed against them by the waves with so much violence that their masts quivered as if they would

fall at every successive blow; and the destruction of the ships seemed inevitable from the tremendous shocks they received. By backing and filling the sails, we endeavoured to avoid collision with the larger masses, but this was not always possible; in the early part of the storm the rudder of the *Erebus* was so much damaged as to be no longer of any use; and about the same time I was informed by signal that the *Terror's* was completely destroyed, and nearly torn away from the stern post. We had hoped that, as we drifted deeper into the pack, we should get beyond the reach of the tempest; but in this we were mistaken. Hour passed away after hour without the least mitigation of the awful circumstances in which we were placed. Indeed, there seemed to be but little probability of our ships holding together much longer, so frequent and violent were the shocks they sustained; the loud crashing noise of the straining and working of the timbers and decks, as she was driven against some of the heavier pieces, which all the activity and exertions of our people could not prevent, was sufficient to fill with dismay the stoutest heart that was not supported by trust in Him who controls all events; and I should commit an act of injustice to my companions if I did not express my admiration of their conduct on this trying occasion; throughout a period of 28 hours, during any one of which there appeared to be very little hope that we should live to see another, the coolness, steady obedience, and untiring exertions of each individual were every way worthy of British seamen. The storm gained its height at 2 p.m. when the barometer stood at 28·40 inches, and after that time began to rise. Although we had been forced many miles deeper into the pack, we could not perceive that the swell had at all subsided, our ships still rolling and groaning amidst the heavy fragments of crushing bergs, over which the ocean rolled its mountainous waves, throwing huge masses one upon another, and then again burying them deep beneath its foaming waters, dashing and grinding them together with fearful violence. The awful grandeur of such a scene can be neither imagined nor described, far less can the feelings of those who witnessed it be understood. Each of us secured our hold, waiting the issue with resignation to the will of Him who alone could preserve us and bring us safely through this extreme danger; watching with breathless anxiety the effect of each succeeding collision, and the vibrations of the tottering masts, expecting every moment to see them give way, without our having the power to make an effort to save them."

Compare with this the following extracts from a paper read at the Royal Scottish Geographical Society's meeting at Edinburgh, in January of this year, by Mr. W. S. Bruce, naturalist to the steamship *Balæna* during the expedition of

1892-3 :—"Like our predecessors, we found it to be a region of gales and calms—gales from the north, with wet fog; gales from the south, with blinding snow; calms with fog, and calms with brilliant sunshine." Then, after giving a glowing description of a beautiful Christmas eve, he proceeds :—"This is the picture of a calm midnight in midsummer, different, indeed, from the heavy weather we experienced at other times, when for days we sheltered behind bergs and streams of pack during black nights thick with fog and snow. One of the gales we encountered the skipper described as the hardest that ever blew in the Arctic and Antarctic; and, indeed, it was stiff. For ten hours we steamed as hard as we could against it, and at the end had made only one knot. Picture to yourselves a sailing vessel: What a different agency we have now! Where Cook, Ross, Weddell, and others would have been in the greatest peril, we with steam were comparatively safe."

And Dr. Donald, of the same expedition, after referring to Ross's experiences of storms in the stout old *Erebus* and *Terror*, speaks in terms similar to those of Mr. Bruce as to the changed conditions due to steam.

But it is not only with regard to safety in storms that the use of steam has altered the conditions under which Antarctic exploration can be undertaken, it is a yet more important factor in connection with the power it gives to take advantage of opportunities and to contend with circumstances. Polar navigation, and especially Antarctic navigation, is the subject of what, until we know more of the laws that govern seasons and climatic and other conditions that affect it, we must call luck or good fortune. For instance, in 1823 Weddell found a clear sea which enabled him to push his little cutter to the 75th deg. of south latitude, four degrees farther than the limit fixed by Cook when he said, "I can be bold enough to say that no man will ever venture farther than I have done." And yet when Ross with his well found ships tried to surpass Weddell, he could on the same longitude get only to the 65th parallel. And again in 1841 Ross entered the main pack south of Campbell Island at the 67th parallel of latitude and got through it in four days. The next year he encountered the pack in 61 deg. 15 min., and it took him forty-four days to get through it. Now amidst all this uncertainty as to the conditions in which the polar ocean will be found there can be no doubt Ross did all that a skilful and daring seaman could do with the means at his command, and it is beyond all praise that he did so much. But what if he had had steam power? During all that terrible gale in the pack he so wonderfully describes in the extract I have given, the S.S.W. wind was driving him, together with the pack, back to the northward. If he could have done what the *Balæna* did last

year, and held his own, the pack would have soon drifted past him. At the discussion on Dr. Murray's paper on Antarctic exploration read at the Royal Geographical Society's meeting on the 27th November last, Sir R. Vesey Hamilton said that with a steamer Ross's forty-four days in the pack would probably have been reduced to four. And he went on:—"I believe now that the amount of work that was done by Sir James Ross in three seasons could be done in one season with modern steam power, and I have some knowledge of ice navigation, having been three winters and five summers in the Arctic regions. Now the greatest enemy to a sailing ship is a gale in the ice heavily packed, as we have seen from the diagrams; then the ships are in great peril, perhaps for steam as well as sailing ships; but after the gale comes a calm, when the ice opens out and the steamer would immediately make rapid progress, while the sailing ship might be unable to move for some days."

And it is not only in cases like these mentioned by Sir Vesey Hamilton, that sailing ships are at a disadvantage. The readers of Sir James Ross's account of his voyages will come over and over again to passages describing how calms and contrary winds or currents baffled the great navigator at most critical times when a coastline had to be left unexplored or an opening in the ice left unentered. Had it been possible to have taken advantage of these lost opportunities, how much might the bounds of our knowledge of Antarctic regions been enlarged.

I have shown on the accompanying chart what, with regard to certain subjects, are the bounds of our present knowledge of those regions. It is based on information given in Dr. Murray's charts—our greatest authority on the subjects referred to. As regards the conformation of the coasts of Antarctic land or lands, what is known is distinguishable from what is hypothetical by difference of shading; and sources of the knowledge are shown by the tracks of all navigators known to have crossed the Antarctic Circle. Their voyages are well summarised in Mr. Sprent's paper recorded in our transactions. The chart also shows the bathymetric curves, and the summer temperature curves of the circumpolar ocean and air—important factors in relation to Antarctic exploration.

With respect to what has already been done in Antarctic regions by far the most important performances were those of Weddell in 1823, and of Ross in 1841 and 1842. Weddell's track, between 30 deg. and 40 deg. of west longitude, traverses the deep basin of the South Atlantic, and he did not get much beyond the 2,000 fathom curve. The relatively warm water that exists in the deeper parts of the Antarctic ocean probably accounts for the open water Weddell found. Sir

James Ross describes the upthrow of this warm layer of water caused by the southerly submarine current from the tropics meeting the gradual rise of the sea bottom as it approaches land. And Dr. Murray, in the paper already referred to, says that "these deep layers of relatively warm water appear likewise to be slowly drawn southwards to the Antarctic area, to supply the place of the ice-cold currents of surface water drifted to the north. This warm underlying water is evidently a potent factor in the melting and destruction of the huge table-topped icebergs of the Southern Hemisphere." The difference between the temperature of the surface and underlying water in the deep basin crossed by Weddell is shown by Ross's sounding in it when he reached no bottom with a 4,000 fathom line, and when with a surface temperature of the water of 30·8 deg. he found a temperature of 39·5 deg. at 1,050 fathoms—the greatest depth to which he could trust his self-registering thermometers.

Ross's tracks within the Antarctic Circle in 1842 and 1843, between 170 deg. east and 160 deg. west longitude, took him across no such deep basin, for the soundings varied from about 1,600 fathoms on the Circle to 150 as he approached land. But the influence of the warm underlying current from the north was always noticeable, the temperature of 39·8 deg. being repeatedly found at 600 fathoms with a surface temperature below freezing point; and at his farthest south, with soundings of only 250 fathoms, the shoaling had brought the warmer water to the surface where its temperature was 32 deg. with a mean air temperature of 27 deg. The temperature of the sea at the bottom was 33·2 deg.

In a conversation I had the other day with Captain Pascoe, he incidentally mentioned another factor that may have much influence in keeping an open sea in the neighbourhood of Ross's tracks in 1841 and 1842. These tracks pass along what is probably the main line of the earth's volcanic and seismic action in the southern hemisphere—the line marked by the New Zealand volcanoes and Mount Erebus. Earth tremors would certainly do much to help forward the action of the water on the great ice barrier that guards the coast of Victoria Land.

It must always be borne in mind that our knowledge of Arctic regions enables us to predicate very little in connection with Antarctic. The circumstances of the two poles—and especially the meteorological circumstances—are so entirely, and, at present, so unaccountably, different, that reasoning from Arctic data is almost inevitably misleading with relation to Antarctic facts and conditions. All navigators who have been in both are continually recording how unlike the one polar region is to the other. Many of the meteor-

ological conditions are, with our present knowledge, quite unaccountable. For instance, why should the barometric pressure be so much less in the south than in the north? There is probably half an inch of mercury of difference. The effects of this are very evident in the southern zone of south-westerly winds with rain and snow all round the globe, but what is the cause? Again, we have all read of the short but for the time genial summer of the Arctic regions—why is there none in the Antarctic? Ross, when close to the great Victoria land ice barrier writes:—"Gigantic icicles depended from every projecting point of its perpendicular cliffs, proving that it sometimes thaws, which otherwise we could not have believed; for at a season of the year, eqvivalent to August in England, we had the thermometer at 12 deg., and at noon not rising above 14 deg.; this severity of temperature is remarkable also when compared with our former experience in the northern seas, where from every iceberg you meet with streams of water are constantly pouring off during summer.

Another remarkable phenomenon connected with what should be the Antarctic summer is the very small range of the temperature both diurnal and seasonal. In Ross's book the abstract meteorological journals given show for January, 1841, a maximum daily range of 12 deg. Fah. and a minimum one of 1 deg.; and for February, 1841, a maximum daily range of 10·5 deg. and a minimum of 1·5 deg. And last year Mr. Bruce had similar experience in the *Balæna*. He says in the paper from which I have already quoted:—"The records of air temperature are very remarkable; our lowest temperature was 20·8 deg. Fah., our highest 37·6 deg.—only a difference of 16·8 deg. in the total range for a period extending slightly over two months. Compare this with our climate, wherein a single day and night you may get a variation of more than twice that amount. . . . The average temperatures show a still more remarkable uniformity. December averaged 31·14 deg. for 115 readings; January, 31·10 deg. for 198 readings; February, 29·65 deg. for 116 readings—a range of less than $1\frac{1}{2}$ deg. Fah. From these records of temperature Mr. Bruce and Dr. Murray and other authorities think it very probable that there is a comparatively small range of temperature all the year round in Antarctic regions, and that the cold of winter would not be so terrible as is imagined by some.

The result of the great amount of precipitation taking place in the zone of low pressure and in a summerless climate, is that the whole coastline of land within the Antarctic Circle is covered with an icecap of enormous thickness. But from observations of the prevailing winds in the south polar regions, it is almost certain that the zone of low barometric

pressure and its accompanying great precipitation does not extend to the pole. Dr. Murray, in the paper we have already quoted from, says:—"It is probable that about 74 deg. S., the belt of excessive precipitation has been passed, and it is even conceivable that at the pole precipitation might be very little in excess of, or indeed, not more than equal to, the evaporation." It is, therefore, very likely that instead of the thickness of the snow or icecap on the Antarctic lands being 10 or 20 miles as estimated by the late Mr. Croll, Dr. Murray's estimate of 1,800 feet as the maximum is nearer the truth, as this estimate slightly exceeds the calculated thickness of the greatest southern bergs and floating ice islands.

In consequence of this all-prevailing mantle of frozen snow, "no land animal and no trace of vegetation--not even a lichen or a piece of seaweed—has been found on land within the Antarctic Circle." The whalers last year brought back some fossils, probably from tertiary rocks, that "distinctly indicate the existence of more genial conditions within the Antarctic in past geological times."

But as Dr. Murray says:—"When we turn to the waters of the Antarctic ocean we find at the present time a great profusion of life, both animal and vegetable. During the *Challenger* expedition myriads of minute spherical tetrasporæ were observed to give the sea a peculiar green colour over large areas. Diatoms were frequently in such enormous abundance that the tow nets were filled to the brim with a yellow-brown slimy mass, with a distressing odour, through which various crustaceans, annelids, and other animals wriggled. . . . Occasionally vast quantities of copepods, amphipods, etc., were observed to give the ocean a dull red colour. . . . . These small crustaceans are in turn the chief food of the fishes, penguins, seals, and whales which abound in the waters of the great Southern Ocean." How abundant and varied the animal life of this part of the ocean is may be judged from the fact that Dr. Murray mentions that the *Challenger* trawl and dredge obtained from waters lying farther south than Tasmania 326 new species, and 119 new genera from depths varying from 1,260 to 2,600 fathoms, and that one-half of the new species and a quarter of the new genera were not obtained elsewhere.

Now what is to be done in the matter of Antarctic exploration? Dr. Murray answers:—"A dash at the South Pole"—(like that which Nansen is making at the North)—"is not what I now advocate, nor do I believe that is what British science at the present time desires. It demands rather a steady, continuous, laborious, and systematic exploration of the whole southern region, with all the appliances of the modern investigator. This exploration should be undertaken by the Royal Navy. Two ships not exceeding 1,000 tons should, it

seems to me, be fitted out for a whole commission, so as to extend over three summers and two winters. Early in the first season a wintering party of about ten men should be landed somewhere to the south of Cape Horn, probably about Bismarck Strait, at Graham's Land. The expedition should then proceed to Victoria Land, where a second similar party should winter, probably in Macmurdo Bay, near Mount Erebus. The ships should not become frozen in, nor attempt to winter in the far south, but should return towards the north, conducting observations of various kinds along the outer margins of the ice. After the needful rest and outfit at the Falklands, or Australia, the position of the ice and the temperature of the ocean should be observed in the early spring, and later the wintering parties should be communicated with, and, if necessary, reinforced with men and supplies for another winter. During the second winter the deep-sea observations should be continued northwards, and in the third season the wintering parties should be picked up and the expedition return to England. The wintering parties might largely be composed of civilians, and one or two civilians might be attached to each ship; this plan worked admirably during the *Challenger* expedition.

In the discussion which followed the reading of Dr. Murray's paper, and in which Sir Joseph Hooker, the Duke of Argyll, Sir George Nares, Sir R. Vesey Hamilton, Captain Wharton, Lord Charles Beresford, Sir Wm. Flower, and others took part, general agreement was expressed with Dr. Murray's plan of campaign, and much enthusiasm was shown. If any doubts were expressed about the commercial utility of such an expedition, none were possible as to the priceless advantages that would accrue to science from it. Its popularity would be immense both in the Navy and in the scientific world, and the difficulty of manning the expedition would only be the embarrassment of choice.

At the Royal Scottish Geographical Society's meeting in January, after papers by Mr. Bruce and Dr. Donald on the scientific results of last year's whaling trips to the South Shetlands, a resolution was passed to send a memorial to Government in favour of a national expedition.

I have purposely avoided saying anything directly bearing on the commercial aspect of the question as to the desirability of sending such an expedition, because I think that is not our business. Commerce can and ought to take care of itself. And if we as a nation only sent out expeditions where we were sure beforehand of success from a commercial point of view, no interest would have suffered so much as the commercial interest of the Empire. Thorough scientific exploration has usually been followed as a natural consequence by commercial development. In this case the scientific

interests are so important as to fully justify their being regarded as of such national concern as to require a special expedition. The *Erebus* and *Terror* were fitted out virtually only to obtain information with regard to terrestrial magnetism—that science is now as much in need of further information as it was then. And all the other sciences I have incidentally mentioned are equally interested. And with reference to all these sciences, in addition to our general interest, we have in Tasmania a particular one especially in connection with terrestrial magnetism, for we could probably offer the nearest site to the south magnetic pole for a permanent magnetic observatory. I hope that in connection with the revived interest in Antarctic research, and perhaps in connection with the Leake astronomical bequest and our University, such an observatory may be re-established in Hobart as that which did such good work under Ross and his successors.

In conclusion, I may claim to be consistent with regard to my opinion that this work should be done by the Royal Navy. A year or two ago I had the honour to stand and vote alone in this room in opposition to a proposed subvention from the Australian colonies to aid Baron Nordenskjold's projected Antarctic expedition, on the ground that it was a national matter and should be undertaken by the Royal Navy. I think so still; but as I then explained I included in the Royal Navy the Australian contingent, and I hope that if one can be made suitable for ice work, one of the two proposed vessels will belong to the little fleet to which we all contribute.

Page 51, line 30.—For coceifera, read *coccifera*.

" 54 " 34 and 36.—For pubeseous, read *pubescens*.

BOTANICAL NOTES.

By L. Rodway.

(Read June 11th, 1894.)

In November, 1886, Mr. T. B. Moore drew our attention to what he considered a new Eucalypt that he had found growing on the sub-alpine range between New Norfolk and the Huon district. He described it, and named it after our greatly esteemed friend Baron Von Müeller.

The Baron had already had an opportunity of examining the plant, having found it some years previously towards the summit of Mount Field east. He did not consider it distinct, but thought it probably a lowland form of *E. vernicosa*, H.

The tree has probably a wide sub-alpine distribution in south-western Tasmania, as besides meeting with it in quantity in both localities named, I have found it extensively dispersed round the southern slope of Mount Wellington at about 2,000ft. elevation, where it can be seen in quantity in the region of the Springs Track to the Two Bridges and Forked Creek Rivulets, where it forms the principal timber.

I also have an undoubted specimen of this plant, but with rather different opercula, gathered by Mr. Wm. Fitzgerald on Mount Giekie.

The tree has probably been overlooked in many localities. It grows with and is very like *E. urnigera*, H., with which I have no doubt it has been confounded. The two trees can hardly be distinguished when seen together, and with *E. müelleri* the branches are very tough, so that it is most unusual to pick up broken limbs with inflorescence. With *E. urnigera* on the contrary the wood is brittle, so that at this time of the year the ground in such a forest would be comparatively strewn with its flowers. Another cause of the overlooking of *E. müelleri* by botanists is that its buds and fruit are practically exactly similar to those of *E. coceifera*, Hh., and till one was fortunate enough to secure flowers and detect the parallel anther-cells the distinctness would not suggest itself. Whatever the cause may be this tree, which is most distinct from any eucalypt but *E. vernicosa*, grows in quantity by the side of the track below the Springs, attains a height of 200ft., and yet has barely attained the dignity of a name.

It remains still a matter of opinion whether the tree should be considered specifically distinct from *E. vernicosa*, H. Its close relationship is undeniable, but the fact that this tree appears to die out at a sub-alpine altitude, and the dwarf

alpine *E. vernicosa* not appearing in localities where this is so common, would lend some weight in support of the trifling structural differences. Beyond the greater dimension of the tree the leaf is more oblique, longer proportionately, and the veins more regular and less oblique than in *E. vernicosa*, and the calyx and capsule are larger. But these differences are not more than could be reasonably expected from the greater vigour.

The wood is of a pale red colour, and rather heavy; of a close fibrous texture of great tenacity, and is commonly used for palings and shingles, but it makes excellent axe-handles, and would be very useful for all purposes where considerable strength and toughness were required.

Mr. Moore's description, though very lucid, does not include all one would wish, I therefore take this opportunity to describe it more fully:—

Eucalptus müelleri, T. B. Moore. A tree often attaining 200 feet. Bark scaly at the base, smooth above, glaucous, but becoming blotched with rufous green on prolonged exposure. Leaves alternate, petioled, slightly oblique, 3-5in. long, ovate to narrow, lanceolate, acute, margin crenate, veins obscure, rather numerous and oblique. Peduncles axillary about $\frac{1}{2}$in. long, angled. Flowers sessile, normally 3. Calyx in the mature bud obscurely angled, 4 lines long, operculum rather flat to sub-conical, verrucose and umbonate. Flowering calyx turbinate, 3 lines diameter. Stamens $2\frac{1}{2}$ to 3 lines long, anther-cells parallel. Fruit broadly turbinate, slightly angled, 4 lines diameter; capsules deeply sunk, the valves just reaching the top of the rim.

Mount Wellington, Mount Field East, Mount Geikie, about 1,500 to 3,000 feet elevation. Flowering in May and June.

In a paper I had the honour of reading before the Royal Society last year, in alluding to the varied forms assumed by *Actinotus bellidioides*, B., I referred to a form in my possession with divided leaves. Since that time my indefatigable young friend, Wm. Fitzgerald, has found this form in different places, and in all stages of development. Its distinct spreading habit, alternate and divided leaves and peculiarities of inflorescence maintain themselves even when growing with *A. bellidioides*, but it was only after mature consideration that Baron von Müeller, to whom it was submitted, consented to name it, which he did by giving it the name of its discoverer, T. B. Moore. The description has been left in my hands.

Actinotus moorei, F.V.M., a small tufted and creeping perennial, usually with procumbent leafless branches extending 1 to 3 or more inches, the leafy ends ascending. Leaves alternate 3-segmented, but the lateral segments usually more

or less deeply cleft, each segment 2 to 3 lines long, lanceolate, acute ; petiole slender, about 4 lines long, with a short broad sheathing base, clothed with white silky hairs. Peduncle terminal, from very short to 1½in. long, slender, hairy. Umbel about 2 lines diameter ; bracts about 6, very shortly united. Flowers about 5, calyx-limb apparently always 4-lobed and shortly tubular above the ovary. Petals none. Stamens apparently always 2.

Mount Hamilton, Mount Reid, Mount Tyndall, Hartz Mt.

Haloragis heterophylla, Brogn. This plant appears to have escaped addition to our census, not so much from its rarity than from its likeness to its relatives. Its divided leaves has often placed it with *H. ceratophylla*, Endl. It differs in the leaf, however, from that species in these organs being opposite, and in the flower and fruit it is closely allied to *H. tetragyna*, R. Br.

I have specimens gathered near Evandale some years ago by Aug. Simson, and about two years ago by Wm. Fitzgerald near Campbell Town. It is also very common on the flats and banks of the Jordan above Bridgewater.

The genus Vallisneria is one that has always found great favour in the eyes of botanical students from the peculiarity of its flowers. The pistillate flower is solitary, and is developed on a long peduncle that is spirally coiled when young, but at maturity uncoils to allow the stigmatic lobes to be exposed at the surface of the water. The male flowers are extremely minute and numerous, and are formed on a rhachis within a spathe in the leaf-axils. When the buds are about ripe they escape from the spathe, rise to the surface of the water and there open. They float down the stream in great numbers, and generally some of them have the good fortune to meet the object of their being, the pistillate flowers. Vallisneria is distributed throughout the tropical and warm temperate portions of both hemispheres, and is generally considered to contain but one species, though an effort has occasionally been made to separate the Australian form as a distinct species. It would appear as though our Tasmanian plant at least had never received the fair treatment of being examined in the living condition, for the only descriptions I am aware of that passes to represent it does not accord with it. I am not disposed to take the responsibility of giving our plant a separate name, but for the sake of convenience and to mark its distinctness I will in describing it mark it as a variety.

Vallisneria spiralis, var. *procera*. Plant submerged, stoloniferous. Leaves 1 to 3 feet long, 1in. wide, the margin thick obtuse, and often serrulate towards the apex. Male

inflorescence on a very short peduncle in the leaf axils; spathe about $\frac{3}{4}$in. long, rather narrow, bursting into two valves or irregularly soon disintegrating. Flowers minute, very numerous on a slender rhachis nearly as long as the spathe, each flower on a slender deciduous pedicel, parting from the rhachis when mature, rising to the surface of the water and there opening. Perianth 3 lobed about $\frac{1}{8}$ to $\frac{1}{6}$ line diameter, the lobe not opposite a stamen narrower than the other two. Stamens 2, filaments combined in a very short column surrounded at the base by a ring of hairs, and bearing at the base two rudimentary staminodes. Anthers bilocular, but the walls destroyed upon dehiscence.

Female spathe about 1in. long, narrow, bursting as in the male, but rather more persistent, on a long peduncle that is usually but not always coiled when young. Ovary about 1in. long. Perianth lobes 3, broad, obtuse $1\frac{1}{2}$ to 2 lines long, stigmas 3 broad, opposite the perianth lobes, each divided to the base. Staiminodia none. Capsule much enlarged, its peduncle not recoiling after fecundation in the very numerous plants examined.

Jordan River above Bridgewater. Flowering in February.

Stipa pubescens, R. Br., is one of our widest spread native grasses, and its variability is about as wide as its distribution. Its type and the forms running absolutely into *S. semibarbata*, R. Br., are well known, but we have a form common in dry, stony, hilly country that departs considerably in habit from any form I have seen described. The stems arise from a persistent hard slowly spreading base as we usually find in the type, but they are nearly glabrous, and develop no leaves beyond the sheaths, and the sheaths and their insignificant laminæ turn dry and pale as soon as elongated, giving the plant a very distinct appearance. The details of the plant otherwise do not differ from accepted forms of *S. pubesceous*, but its habit makes it sufficiently marked to warrant its being treated as a variety as *Stipa pubesceous*, var. *aphylla*.

Gaimardia fitzgeraldi, F. v. M. et R.

1. Natural size.
2. Flower head.
3. ,,
4. ,,
5. Upper bract.
6. Rudiment in upper bract.
7. Outer bract opened, upper bract removed to show flower.
8. Capsule.
9. Seed.

ON A NEW CENTROLEPIDEÆ.

By L. Rodway.

(Plate.)

(*Read July*, 1894.)

The small order *Centrolepideæ*, an offshoot of *Restiaceæ*, has its distribution mostly Australian. Tasmania is particularly fortunate in species numbering 12 out of a total of about 24 that have been described.

The order includes, according to the usually accepted classification, four genera: *Aphelia*, *Centrolepis* (including *Alepyrum*), *Trithuria*, and *Gaimardia*. Tasmania has long had recorded good specimens of the first three genera, and I have now the good fortune of adding a member of the fourth, *Gaimardia*, which has hitherto been found only in New Zealand and the South Seas to S. America.

The genus *Gaimardia* differs from *Centrolepis* in the carpels being placed on the same plane, and possessing two stamens.

I describe the plant in conjunction with our truly respected Fellow, Baron von Müeller, and we name it after its first discoverer, W. Fitzgerald, F.R.H.S.

Gaimardia fitzgeraldi, n. sp. A small perennial forming pale green densely matted cushions from a few inches to 2 feet, sometimes more scattered. Stems slender, 1-2in. Leaves numerous, sub-distichous, sub-erect, but spreading towards the tip; sheath stem clasping at the base only 2-3 lines long, with a tuft of woolly hairs at the junction with the lamina; lamina, $\frac{1}{4}$ to $\frac{1}{2}$in. long, filiform, with a flat upper surface; the apex piliferous and hyaline. Scafes solitary in each year; lateral, or if terminal, soon thrust aside by an innovating shoot about $\frac{1}{2}$in. long, slender. Lower floral bract, glabrous, about 1 line long, with an obtuse or toothed apex containing one flower. Upper bract rudimentary and bearing a rudiment. Scales none. Stamens 2, and alternating with the carpels. Carpels 2 in the same plane, connate. Styles free, diverging.

Mount Geikie, W. Fitzgerald. Adamson's Peak and range from Hartz to Mount La Perouse.

The plate is from fresh flowering specimens I procured on Adamson's Range.

FURTHER DISCOVERIES OF GLACIATION, WEST COAST, TASMANIA.

By T. B. Moore, F.R.G.S.

(Read August 14, 1894.)

Through the courtesy of Messrs. E. J. Dunn, R. M. Johnston, and A. Morton I have received the two former gentlemen's and Mr. Montgomery's papers of last year on Glaciation.

First I shall make a few comments on these papers, then relate my own experiences since writing on this interesting and important subject.

Both Messrs. Johnston and Montgomery take exception to my giving Mr. Dunn the honour of being the discoverer of land glaciation in Tasmania. I was quite aware that *evidences* of boulders, etc., transported by floating ice had been discovered, and surmises made that land glaciation had existed, but I still think that Mr. Dunn was (to use Mr. Montgomery's own words) "the first to bring forward *indisputable proofs*" of prehistoric glaciers, and this was my meaning when I wrote last year.

With regard to former discoveries enumerated in Mr. Johnston's list of "Principal Sources of Reference," I might rank as one of the early discoverers of *evidences*, although not mentioned in this list. For in 1883 I visited Lake Dixon, and also passed over Painters Plains, and was struck by the number of scattered granite and greenstone boulders and large boulders of the latter rock resting on the summit of Artist Hill and other prominent heights; also similar evidences all through the Collingwood Valley. Here the boulders were grooved, and the positions in which they were lying, "end on," pointed that they had been transported by the agency of glaciers from the Eldon Peak and Mount Gell. In my Government report, 1883 (and I believe 1886), which was printed and laid on the table of the House of Assembly, the above statement is recorded. In conversations I had about this time with my old friend Sprent and Mr. Johnston, I was under the impression that both concluded that the large boulders had been deposited by floating ice, and as late as 1889 Mr. Stephens, Director of Education, expressed this theory when asked by the Bishop of Tasmania, at Mount Arrowsmith, his opinion relative to the Collingwood boulders. Mr. Johnston's first paper with reference to erratics on Maria Island, brought by floating ice, was in 1884.

In 1887 another paper by his fluent pen is recorded, which I conclude would be written affer his trip in 1887 with Mr. C. P. Sprent and party along my track of 1883 and 1886, which at the time of their journey had for a great part of its distance been formed into a horse track.

It is on this journey, following on my footsteps four years later, that Mr. Johnston first finds his evidences of land glaciation at Lake Dixon, in the vicinity of Mount Gell. Being the first explorer in this direction to the West Coast, in all probability Mr. Sprent had one of my reports with him with remarks as to glacial action, as it was principally through his instructions as Deputy Surveyor-General I conducted my explorations. It was also after this trip that Mr. Sprent wrote his paper for the Victorian Branch of the Royal Geographical Society of Australasia, containing notes relative to glaciation in Tasmania. During this tour Mr. Johnston mentions that he spent three days in examining more particularly the rock formations on Mounts Owen, Lyell, and Sedgwick. This statement requires explanation, as it would appear that glacial action at that date had been found in the vicinity of Mount Sedgwick; to have reached Mount Sedgwick alone at that time four long days would be required to complete the journey there and back, therefore we must conclude our good friend had the use of a flying machine, or was mistaken in the mountains he visited.

With regard to the ancient glacial conglomerate, Mr. Johnston agrees with Mr. Dunn and myself that the conglomerates at Mounts Read and Sedgwick have originally been deposited under water by floating ice and belong to a very ancient epoch.

Mr. Dunn in his paper entitled "Glaciation of the Western Highlands, Tasmania" (in Proc. R.S. Vic., 1893), states with reference to the Mount Read conglomerate:—"There is a marked similarity in the nature of the cementing material and in the character of the embedded pebbles and boulders to the glacial conglomerate found at Wild Duck Creek, Victoria, and to the Dwyka conglomerate of South Africa, and they probably all belong to a very ancient epoch, either near the close of the Palæozoic period or else the commencement of the Secondary era." Mr. Johnston (page 35) says: "It is possible that some of the thick conglomerate beds occurring in the vicinity of Mount Tyndall, Mount Lyell, and Mount Owen* in which marks of ice action are reported to have been recently discovered by Messrs. Dunn and Moore may yet prove to belong to the same horizon" (Permo-carboniferous). The ice marks in the conglomerate beds at Mounts Read and Sedgwick may belong to the Permo-

* Specimens with ice marks were sent from these conglomerates last year to illustrate my paper.

carboniferous period as Mr. Johnston surmises, but the boulders and pebbles in the recent moraines north of Lake Margaret and on the Linda Company's ground at Mount Lyell cannot be confounded with the ancient conglomerates, for the scored boulders are all of local origin, differing in character and form from the rocks of the ancient conglomerate; the scorings are also much deeper and decided in appearance. If parts of the older conglomerate had been disintegrated from the parent mass and become mixed with the recent morainal matter, the scorings would have been obliterated, for the best specimens from the ancient beds, bearing the deepest ice marks, are in rocks of a soft nature, though some of the harder ones are marked with very fine scratches.

Mr. Montgomery in his able paper read last year, entitled "Glacial Action in Tasmania," remarks that I state Mounts Sedgwick and Dundas are capped with greenstone; he adds to these Barn Bluff, Mount Pelion, Mount Ossa, the Ducane Range, the Eldon Range, East Mount Pelion, and the Oakley Range as showing the same feature. The additions compose part of the great greenstone plateau of the centre of the island, or I should say a long offshoot of the same, dividing the waters of the northern and western rivers. This high dividing chain of mountains should not be confounded with the West Coast Range with its two isolated peaks of greenstone, Mounts Dundas and Sedgwick; except these and the schistose summits of Mounts Read and Darwin, all other eminences in the West Coast Range are capped with a quartzose conglomerate. In my paper I noted the peculiarity of these greenstone peaks as differing from the formations on the other heights of the range.

Mr. Montgomery found in his additions the columnar greenstone resting on the coal measures, which is a noticeable feature on the great greenstone plateau further south from his explorations, and surmises what he terms the moraine at Mount Sedgwick to be coal measures similarly situated. As we once visited Mount Dundas together, Mr. Montgomery is aware that this feature is not seen there, and when he has leisure to examine Mount Sedgwick, I do not think he will conclude that the greenstone rests on the *ancient glacial conglomerate*, but he will find rounded detached masses of the conglomerate resting on a porphyretic spur on the western side of the mountain, which have been disentegrated from the parent bed situated on the south-east side, and probably carried to their present resting places during the recent glacial epoch. He adds, "I cannot think it at all probable that Mr. Moore is correct in referring the conglomerate containing fossils to the action of floating ice. It seems more likely that it is a moraine drift derived from the lower beds of the

carboniferous formation, which farther north, near Barn Bluff and Cradle Mountain, consists mainly of conglomerate. These would supply the stones, granite, slate, and porphyry, etc., which Mr Moore has noticed, and also the fossils, and I have little doubt when he comes to examine the country more thoroughly he will find these beds in situ under the greenstone capping. It is hardly conceivable that if the conglomerate was deposited by floating ice action in Permo-carboniferous times, which is what Mr. Moore's words seem to imply, that it should happen that the only proofs of such ice action should be found in a region where there has been evidently severe glaciation at a much later date. Before accepting such a theory, we should first have to eliminate all possibility of the conglomerate having been formed at the later period."

So able an authority as Mr. E. J. Dunn, F.G.S., who discovered a similar bed of glacial conglomerate between Moore's Pimple and Mount Read at an elevation of 3,000 feet, is convinced that it was deposited by floating ice in Permo-carboniferous times, and believes it to be identical with the conglomerates he has reported upon at Duck Creek, Victoria, and in Africa, and further on I hope to convince Mr. Montgomery that the above conclusions are correct.

Let us take Mr. Montgomery's theory "that it is a recent morainal drift derived from the lower beds of the carboniferous formation near Barn Bluff and the Cradle Mountain, which conglomerates would supply the granites, slates, porphyries, etc."

The Cradle Mountain, the highest elevation in Tasmania, is a little over 1,500 feet higher than the deposit at Mount Sedgwick, and if Mr. Montgomery had stated the height at which the lower carboniferous beds occur, it would have added more weight to his argument, and also shown if it were possible that the non-local rocks in the ancient glacial conglomerate at Mount Sedgwick could be derived from this locality, either *at an ancient* or more recent date of glacial phenomena. Besides, if this were a morainal drift derived from this distant locality, would we not expect to find some signs of the more elevated greenstone rocks in the shape of erratics and other non-local rocks on the high plateau round Mounts Geikie, Tyndall, Read, Sedgwick, and Murchison? besides the conglomerate would not be confined to two isolated spots. This would also apply to Mr. Johnston's suggestions that the glaciers may have descended from the great plateau, and that the arrow head of lineal direction of the general trend of striæ may be turned the other way. The question of the small collecting ground remaining above the ancient snow line is difficult to solve.

Is it not more probable that in the recent ice period the rivers

of ice from the Cradle Mountain and Barn Bluff have flowed down and eroded the gorges of the Mackintosh and Murchison Rivers and their tributaries, which at the present time drain these high altitudes, than travelled over their deep-cut gorges a distance of forty miles, to the high land around the peak of Mount Sedgwick? and to substantiate this Mr. Montgomery says "there are grounds to believe that the Valley of the Mackintosh has been scoured out by glacial action." I now hope Mr. Montgomery will accept this theory, and eliminate all possibility of the conglomerate having been formed at the later period, for the only proof of such ice action *is not confined* to a region where there has been evidently severe glaciation at a much later date.

In the beginning of April this year (1894), while travelling from Zeehan to my old friend Sprent's top crossing of the Pieman River, I came across an extensive bed of a similar glacial conglomerate to that at Mounts Read and Sedgwick lying in a low basin-shaped valley about four miles north from the town of Zeehan, and west of the horse track leading to the punt placed on the Pieman River for the use of the Stanley River tin miners.

The bed, as near as I can approximately estimate, is about a mile long by a quarter of a mile wide, and appears of no great depth. I picked up numerous scored pebbles, but in the limited time at my disposal did not obtain any carboniferous fossils. Yet I feel positive they are to be found, for the rocks composing the conglomerate and the binding material are identical with those of the former discoveries of Mr. Dunn and myself.

The height of this bed is between three and four hundred feet above sea level, and if not formed by the agency of floating ice in the Permo-carboniferous age, Mr. Montgomery must allow that the recent glaciers have descended to a much lower level than he anticipated. Finding this extensive deposit at such a low altitude, far from any proofs of recent glacial action, and precisely similar to the other more elevated conglomerates at Mounts Read and Sedgwick, it is only reasonable to suppose that all belong to the same glacial age and method of deposit, as Mr. Johnston describes it, the ancient glacial epoch of Permo-carboniferous age.

In these notes I regret to have to dispute the theories of much abler men in the scientific world than myself, but what information I have gathered is from actual observation, and my records only embrace indisputable proofs of glacial action, which I trust will throw more light on the true aspect of this interesting subject.

In the beginning of July last year (1893) I had occasion to visit the western base of the Craycroft Hills, east of Macquarie Harbour; here I found a huge terminal moraine,

containing boulders principally Devonian conglomerate, in size from the smallest atom to many tons in weight. The morainal matter is composed of rocks of a local origin, and all scored specimens picked up were undoubtedly so, the ice marks being as plainly visible as in the rocks of other recent moraine stuff in localities before enumerated. A small, turbulent, deeply-cut, precipitous stream runs parallel to the moraine, its bed being choked by huge rounded Devonian conglomerate boulders, forming miniature falls and blocks in the creek. The height of this interesting discovery above sea level is only 250ft, and without doubt the deposit has been brought by glaciers from the Craycroft Hills (named after a niece of Sir John Franklin) or Frenchman's Cap. The aspect of these hills, viewed in the distance, plainly shows that a great glacial erosion has scoured their slopes, although their present height cannot be more than 3,000ft. above sea level.

Mr. Montgomery in his paper remarks:—"I think we must come to the conclusion that the whole of the deep gorges among these western mountains now occupied by the head waters of the Pieman, Henty, and King Rivers have been at no very distant period of time occupied by rivers of ice;" and further on says, "If we allow this we must admit the ice came down to within 500 or 600 feet of the present sea level."

These conjectures are correct, for the moraines I reported finding in the King Valley in my supplementary notes last year are about 500 or 600 feet above sea level; and now we have a recent moraine in which indisputable proofs of glacial action exists at a very much lower altitude.

My last discovery is the most important and interesting of all, and will probably throw more light on the extent and age of our glacial action.

In the first week in June, 1894, the long promontory west of Farm Cove, Macquarie Harbour, forming the western boundary of that inlet was visited. Here I found a deposit of morainal matters containing boulders a quarter of a ton in weight. These masses covered the point, beach, and ran far out into the water. Where exposed to the present wave and tidal action all the finer markings and scorings were obliterated, but above and at high water level the ice marks are beautifully illustrated. (Illustrative specimens broken from the boulders, and boulders found at a later date are forwarded.) On my return, two months later, owing to high gales, I had to remain at this point, and spent a day and a half examining the locality. All round the promontory, and for a considerable distance on the Farm Cove side, the striations are really wonderful and many boulders are tons in weight; the largest measured was 15ft. long by 6ft. wide

and deep respectively. Travelling five miles in a north-west direction past Phillip Island, along the present beaches the grooved and scored masses are scattered over the whole of that distance, and similar boulders, with the ice marks obliterated, are found extending far out into the waters of the harbour. Where the raised tertiary beaches have been denuded and now form the present sandy beaches the boulders on the land are covered from sight, but in the shallows of the shore they are plainly visible. The boulders rest on the lignite beds which have been denuded of their original overburden, but cannot be traced below the consolidated sand and fine clayey sedimentary cliffs. They are either exposed to all atmospheric influences or embedded in a recent earthy matter. On the eastern side of the point, the entrance to Farm Cove, a third of the way across is blocked even for navigation by small crafts by masses of boulders, rising in places above high water mark, and forming resting haunts for sea birds.

Let us follow the shores of the harbour past my recent explorations towards the coast to Sophia Point, or even to Strahan. Here we find boulders forming long points, in many places strewn over the present beaches or extending into the water, which if examined probably will prove to be ice-borne blocks.

Raised tertiary beaches enclose nearly all the north-eastern shore of the harbour, as it were, with a formidable wall of consolidated sand and mud. Nowhere do we find boulders in the consolidated mass, only on the unconfined points, heaped together on the narrow roadway at the base of the precipitous sandy cliffs jutting out into the water, or opposite the localities where the raised beaches have been cut out or almost wholly swept away, as at Kelly's Basin and at Farm Cove. On the summits of these sandy walls and all over the surrounding country what I now conclude is morainal matter extends to Mounts Sorell and Darwin ; for the large boulders we find could not have been so shaped, rounded, or deposited by any other means but ice. Travelling up to the valley between Mounts Sorell and Darwin the bed rocks of the creeks are worn smooth, and very little sedimentary material left in their courses. The valley is open, and ranges from 1,000ft. to 1,300ft. above sea level, is a mile broad and two and a half miles long, and has been swept clean of most of the morainal matter, leaving here and there huge, rounded, polished, and grooved boulders, in some instances as large as those described by Mr. Dunn as the Pilgrim, Traveller's, etc., in the Tyndall country. One monster measured 36ft. long, 24ft. broad, and 10ft. high.

The enclosing slopes and shoulders of Mounts Sorell and Darwin are all well rounded and in many places grooved, the

grooves running parallel with the valley, indicating that a great stream of ice has flowed down the course of the Clarke River, located in the centre of the valley, smoothing the bed rock and carrying the debris brought from the surrounding heights into the lowlands. The smaller tributaries are like the larger streams cut down into the solid rock, and contain few traces of morainal matter in their beds. The soft schist and porphyritic rocks on the hummocky and flat rises at the head of the valley have their exposed surfaces worn smooth, and are overlaid with a thin coating of fragmentary ice-worn quartz, or have large erratics with perched blocks resting on their ice-worn summits. The river, after leaving the valley, takes a south-westerly course, and cuts through two large spurs, and in its now rapid course runs straight for Farm Cove, which beautiful inlet and its glaciated boulder promontory make a charming picture looking from the south end of the valley, the only portion of the harbour visible. After reaching the lower lands the stream turns to the eastward and runs in a sluggish course, emptying at last into Kelly's Basin. Rocks similar to those observed on the harbour can be obtained on the highlands, and it is reasonable to suppose they have been transported from there down the Clarke River gorge, seeing that the general tend of that stream is in the direction of the glacial point.

If we look at the precipitous south end of Mount Sorell, not more than three miles from Farm Cove, with its steep spurs running into the harbour, it is easy to suppose that if the glaciers have not descended to water level, that blocks of ice and ice-worn boulders may have been hurled into the harbour. From what I have observed I favour the opinion that the glaciers have travelled to water level, for we find spurs close to the shore of Kelly's Basin and Farm Cove stretching for two to three miles in the direction of Frenchman's Cap, Craycroft Hills, Mounts Sorell and Darwin, covered with morainal matter. These spurs or moraines are composed of a clay intermixed with pebbles and boulders, wholly different in composition and material to the sedimentary raised beaches.

I feel no doubt in my own mind that the pebbles and boulders are ice-borne, for we find in many cases two sides and an end planed, while other parts are rough, a noticeable feature in glaciated stones, compared with the rounded surfaces of those worn by water, indistinct scorings can be observed by a practised eye, to the sceptical perhaps they would not be distinguishable.

Mount Sorell is one of the highest prominences in the West Coast Range, and though we do not find the striæ and grooving on the rocks at such a high altitude as in the vicinity of Mount Tyndall, this would give a larger collecting

ground above the ancient snow line, and seeing that the valleys have been worn and eroded to a greater extent at much lower levels, is it not more than probable that this higher eminence, the seat of prehistoric glaciers, standing, as it does, near the coast line, has let loose its glaciers, which have descended down the steep slopes with nothing to impede their course, and have tumbled into the waters of the harbour before melting ?

A connecting ridge, with grooved summit 1,700 feet high between the two mountains, divides the watershed of the Clarke and Garfield Rivers. The latter stream drains the north ends of the mountains, and is a tributary of the King River. The northern valley is at a much lower altitude (800 feet) and narrow, the gorges are more numerous, longer, and deeper cut. The rocks are all worn smooth, and in places grooved. An occasional erratic is seen, but little morainal matter left in the beds of the creeks, showing that the ice has travelled a considerable distance in this direction.

The principal gorges north and south of the ridge head from Mount Darwin, and the greatest waterflow at the present time comes from that mountain, whose summit I stated in my last year's supplementary notes has no signs of striæ, the rocks being rounded.

The low lying moraine, with its glaciated stones near the Craycroft Hills, conclusively proves that the ice has descended to much lower levels than anticipated by Messrs. Johnston and Montgomery, and the scored boulders near Farm Cove indicate, if not in a general way, in some cases the glaciers have reached sea level.

It is improbable that the boulders at Farm Cove are the results of icebergs in the Permo-carboniferous period, for it will be observed that the scorings on the illustrative specimens are well marked and clear, as if only scratched a few years ago, besides the boulders lie without surface covering, and their polished and scored surfaces have been exposed to all atmospheric influences, and in many cases to wave action. Such being the case, it is hardly possible that the ice markings would have remained so intact for so long a period, *i.e.*, since the Permo-carboniferous era.

If the scored boulders had been deposited by floating ice we would expect to find similar evidences in the tertiary beaches, which I need hardly say have been elevated since the ancient ice epoch ; this not being so clearly proves that our glaciers in some cases have descended to sea level. Also the non-evidence of any signs of ice action, except erosion in the palacogene-lacustrine deposits at Macquarie Harbour will give a good proof as to the age of our recent land glaciation.

Before concluding, I might mention that in the beginning of 1893, during a tour down the coast south of the harbour,

on the quartzite hills four or five hundred feet high, about two miles from and lying above the entrance to the harbour, I noticed the rocks very worn, smooth, and planed, and at the time felt convinced that it was by the agency of ice that the natural surface of the quartzite had been altered, though the positive proof of striæ and groovings was wanting.

It may be surmised that these planed surfaces and the deposits of glaciated boulders on the shores of the harbour are the results of stranded polar drift ice. If such was the case the ice drifts must have occurred before the elevation of the land and beaches, and if so we would obtain traces of glaciation in the palacogene deposits, which we do not. It may have been possible since the elevation of the land for drift ice to have been driven into the harbour through the entrance, but surely we should see some evidences of stranded bergs there.

The similarity in the composition of the scored boulders at Farm Cove is more puzzling to account for than any other feature in the matter.

I regret, through pressure of time, being unable to add a map of this district, for the charting on the large official map of the colony of Mounts Sorell and Darwin and the surrounding country is very incorrect, both mountains being mapped three miles too far to the eastward and not far enough south, besides other physical features being incomplete and wrongly depicted. In 1887 I corrected the errors on the Mines Office chart, and that map would give a better idea of this locality.

1894.

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